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Popular Mechanics Magazine

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Vol. 29 FEBRUARY, 1918 No. 2

Conveyor and Fan Combined in Snowplow

BY combining an endless conveyor with a powerful rotary fan, an inventor claims to have constructed a railroad snowplow that will clear a track of snow of almost any depth, or a mixture of snow and débris, such as results from a slide on a mountain. The machine is built on trucks, is operated by its own engine, and is propelled from behind by a locomotive. The endless conveyor is mounted slantingly at the front, with the forward end close to the ground. As the plow advances, the nose is driven into the snow, which is steadily cut away by the conveyor and discharged into a hood containing the fan, at the upper end of the incline. The fan throws the snow either side of the track, its delivery being regulated by the position of the sides of the hood, which are adjustable.

In respect to its endless conveyor, the machine operates somewhat on the principle of various ditch diggers now in use, and, like them, is designed gradually to eat its way along, regardless of the depth or density of the barrier ahead. The plow is controlled from a cab back of the fan.

Powerful Snowplow Designed to Cut Its Way through the Deepest Drifts: The Endless Conveyor Elevates the Snow to the Fan, Which Delivers It on Either Side of the Track

REVOLVER IS INCORPORATED IN HILT OF SWORD

Although in its present form it may not meet the requirements of trench warfare, a combination sword and revolver of recent invention nevertheless constitutes an interesting weapon. As is obvious, it can be used in both of its capacities simultaneously, if desired. The magazine holds more than a dozen cartridges and a safety device prevents their accidental discharge.

The Weapon may be Used Either as a Sword or Firearm, or Employed in Roth Capacities at Once

MARVELOUS SPEED ATTAINED WITH NEW TELEGRAPH

Within the past few weeks a seven-league stride has been made in high-speed telegraphy. An apparatus, which in actual tests has proved its ability to transmit over a single grounded wire 6,000 words a minute, has been evolved.

The real significance of this escapes one until it is realized that 6,000 words set in type will fill seven and a half standard magazine pages.

More than a year ago the Western Union installed at some of its large terminals a synchronous printing-telegraph system that flashes 180 words a minute in both directions over one wire. The apparatus has been considered an exceptional triumph of ingenuity. Its introduction was a revolutionary step in commercial telegraphy and has been of immense importance. Now comes another mechanism of distinctly original character and striking simplicity that has almost inconceivable capacity.

Details of what appears to be an epoch-making achievement must be withheld for military reasons. It is a war invention and has for its chief purpose the liberation of hundreds of expert operators for the signal corps without disorganizing our much-needed commercial lines. No secret is divulged, however, when the apparatus is described as a printing-telegraph system depending upon a universally used recording instrument that has never before been associated with telegraphy.

Messages are handled in any language or cipher with equal facility and rapidity. The speed of 6,000 words a minute does not hinge upon the use of an abbreviating code, but by such an agency it could be increased several fold. Crack operators are not required. In two hours' time, it is claimed, a quick-witted person with no previous knowledge of telegraphy can be trained to send and receive messages. Instead of being highly complicated and expensive the instruments are not of involved character and can be manufactured for about $50 a set. If used commercially in place of slower apparatus during the war, the secret of the invention could be guarded by placing the instruments in locked cases to which only trusted mechanics would have access when repairs and adjustments were required.

The system is applicable to wireless but so far has not been actually used in connection with it. From 200 to 1,200 words a minute, in contrast with the present speed of from 20 to 30 a minute, is the rate of radio transmission that is considered reasonably certain of attainment. Wireless experiments await government sanction.

BREAKING THE BACK OF A RAIDING ZEPPELIN

ONE of the most striking aerial photographs of the war: The destruction of a Zeppelin "somewhere in France" during recent months. Rising to a high elevation, a French pilot dropped a bomb which struck the dirigible squarely amidships. So far as can be ascertained from the picture, the craft was of the type of 1913. If this conclusion is correct, it must have been about 520 feet in length. The newest and largest Zeppelins are 680 feet long, 75 feet in diameter, and capable of flying 60 miles an hour.

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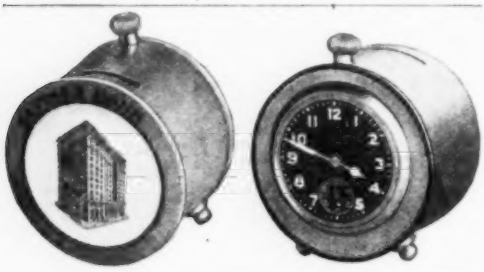
COIN BANK AND TIMEPIECE AN ADVERTISING DEVICE

A clever advertising novelty, designed to promote thrift, is a cylindrical coin bank, in one end of which is set a watch with a luminous face. Two legs keep the bank in an upright position so that it resembles an ornamental desk clock. Coins as large as 50-cent pieces, as well as paper money, may be deposited in it. On the back is an advertisement of the banking institution giving out these attractive articles. The watch can be wound and set without removing it from the bank.



An Advertising Novelty Consisting of a Coin Bank in One End of Which a Watch is Set: A Suitable Business Card is Placed on the Back

BUILD INVISIBLE BARGES FOR SUBMARINE ZONES

If actual trials prove the scheme to be thoroughly practicable, it is understood that in order to check the depredations of the enemy's U-boats, immense ocean-going barges towed by powerful, armed tugs, may be used instead of steamships for transporting freight through the submarine zones. It is stated on good authority that the plan has received serious consideration and that experimental barges are now being built. Long, low-sitting, inclosed craft of steel construction will be tested. Crews being unnecessary, the barges are to be decked a few inches above the water line so that from a distance they will be practically invisible to a periscope. As is perhaps generally known, a tug, because of its small size and comparatively shallow draft, offers a torpedo a poor target. In a gun duel, should a U-boat risk such a fight, the tug would have nearly an even break with the enemy and during the brush could release the barge and maneuver freely.

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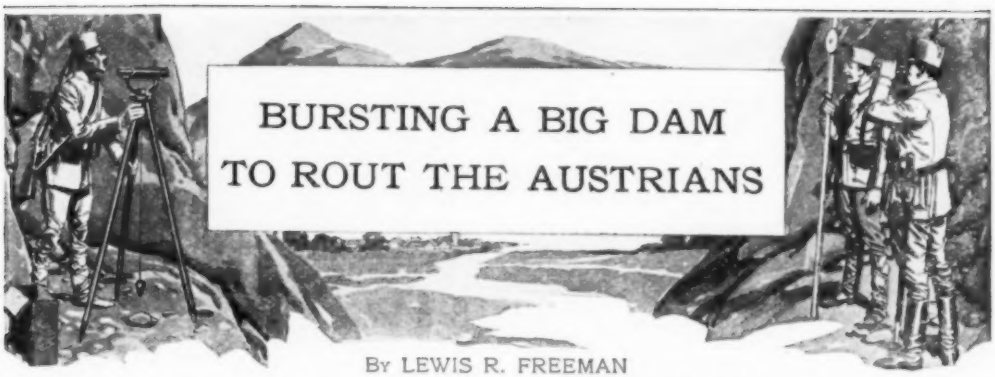
Slipping through the U-Boat Zone: An Ocean-Going Steel Barge in Charge of an Armed Tug, Passing a Lightship Not Far from Port. A New Plan That is to be Tried for Defeating the Submarine



BURSTING A BIG DAM TO ROUT THE AUSTRIANS

By LEWIS R. FREEMAN

IF the average, fairly comprehensively informed student of the war were to be asked what he considered the most remarkable engineering operation that had been carried out by any of the belligerents, he would probably be divided between naming the mining of the Messines Ridge and the blowing off of the top of the Castelletto, Lagazuoi, or another of the great Dolomitic peaks by the Italians. If he had heard of the recent feat of these same resourceful Italians in mining the bed and banks of the Isonzo, to throw up a temporary dam in order to take advantage of the slack water above it to rush their pontoons across in, he might be inclined to favor that spectacular and brilliantly successful exploit for first honors. A Belgian might consider the flooding of Flanders worthy of mention, though the heroic sacrifices incident to that operation really transcended a hundredfold the engineering skill involved in cutting the dikes and railway embankments which held back the overflow. Again, a German might advance the claims of Hindenburg's crafty mining of the ice of the Mazurian Lakes and the subsequent engulfing of tens of thousands of Russians, but in this instance it would be his admiration of the success of the "frightfulness" that would lead him to exalt a comparatively simple piece of engineering work that any sufficiently ruthless commander might have planned and carried out.

The Military Figure Is the Valiant Serbian Commander, Who in the Emergency Presented in the Story Became "Hydraulic Engineer." Mr. Freeman is Seen at the Left

Of the engineering operations of which the public has been told in any detail, undoubtedly the first choice lies between Messines Ridge and the gigantic mining exploits of the Italians; yet it is a sober fact that a fugitive band of Serbs, cut off in a mountain region of their country and completely surrounded by the enemy, provided with no scientific instruments whatever and with only axes, picks, and shovels in the way of tools, successfully performed a feat which every military engineer I have discussed it with has agreed outranks any other achievement of the kind in the war. Indeed, astonishing as were the courage and resourcefulness of the brave men concerned in the fantastic operation, so much did the element of what most men call luck but what the Serbs insist in attributing to Providence figure in the finale, that I am at times more than half inclined to take the view expressed by the returned "Amerikansky" who was the "hydraulic engineer" of the project when he said to me—after detailing the circumstances—"It wasn't our hands, Mister, that did it; b'lieve

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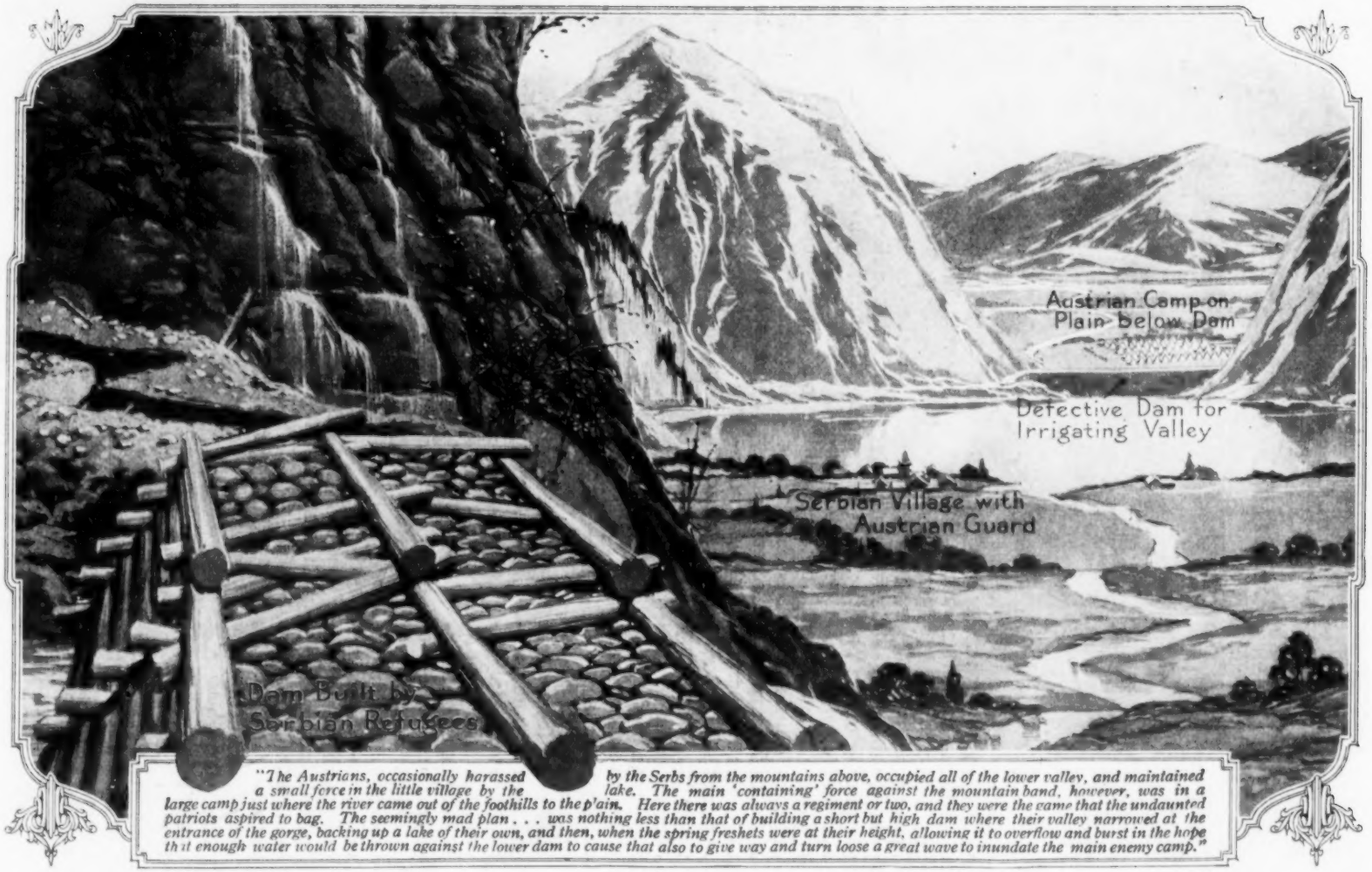

Austrian Camp on Plain below Dam
Defective Dam for Irrigating Valley
Serbian Village with Austrian Guard
Dam Built by Serbian Refugees

"The Austrians, occasionally harassed by the Serbs from the mountains above, occupied all of the lower valley, and maintained a small force in the little village by the lake. The main 'containing' force against the mountain band, however, was in a large camp just where the river came out of the foothills to the plain. Here there was always a regiment or two, and they were the game that the undaunted patriots aspired to bag. The seemingly mad plan . . . was nothing less than that of building a short but high dam where their valley narrowed at the entrance of the gorge, backing up a lake of their own, and then, when the spring freshets were at their height, allowing it to overflow and burst in the hope that enough water would be thrown against the lower dam to cause that also to give way and turn loose a great wave to inundate the main enemy camp."

me, if it wasn't for the hand o' God we'd never ha' pulled it off."

I met this man—I will call him R., as he is now an officer of the Serbian army, and, as such, may not be written of by name—at Corfu last March. He had been taken to America as a boy, and, after working for a number of years in various mining camps of the West, had settled down in the little town of Aldridge, Montana, as the proprietor of a "general store." He was the possessor of a very comfortable fortune at the time of the outbreak of the war, but, in spite of his expanding business, never hesitated for a moment when Serbia's cry for help reached America. He arrived at an Adriatic port early in the war, and subsequently fought—as a private, corporal, and sergeant—with the Serbian army in all its battles up to its retreat before the combined Austrians and Bulgars in the fall and winter of 1915. At this tragic juncture he cast in his lot with a band of devoted but desperate patriots who, rather than submit to the shame of retreat, resolved to make their way to a certain mountain valley—which had been held more or less impregnably for several hundred years by a band or bands of brigands—and die fighting. They reached this natural stronghold without difficulty, and there, though some of them were killed on their frequent forays against the enemy on the plains, as a band they did not die. The Austrians never did succeed in fighting their way up to that mountain-walled valley, and that resolute band of patriots—their losses more than made good by reinforcements that have come to them from escaped prisoners and other Serbs who have eluded the ring of the Austrians—is there to this day, with every expectation of remaining until the time comes when it can descend to the plains to welcome home its brothers in arms when they have fought their way up from the south.

A good many of the exploits of this brave band of Serbian heroes R. told me during the several days I spent in Corfu or in the course of the voyage we made together on the little French packet to Salamis. The most remarkable of all these was the account of their efforts to build a dam in their mountain valley, in order to accumulate behind it a lake, the waters of which could be released at the proper time to swell an already existing lake in a valley below, and, by bursting the lofty but structurally defective dam impounding it, produce a cataclysmic flood which would wipe out an extensive camp of the enemy situated at a point where the river debouched to the plain. As R. very aptly put it, "It was a game of 'hydraulic ninepins' that might have been the pipe dream of a dope fiend, but, by the grace o' God, we brought it off." It was this achievement—I have since verified beyond a question all the salient facts of it at Saloniki—that I have alluded to as being rated by all military who have heard the details of it, as the most remarkable feat of its kind of the whole war. In order to make a long and circumstantial story comparatively short, I must set down R.'s account in my own words, though the fantastic tale loses greatly in effectiveness through the deprivation of his picturesque Serbo-American-mining-camp idiom.

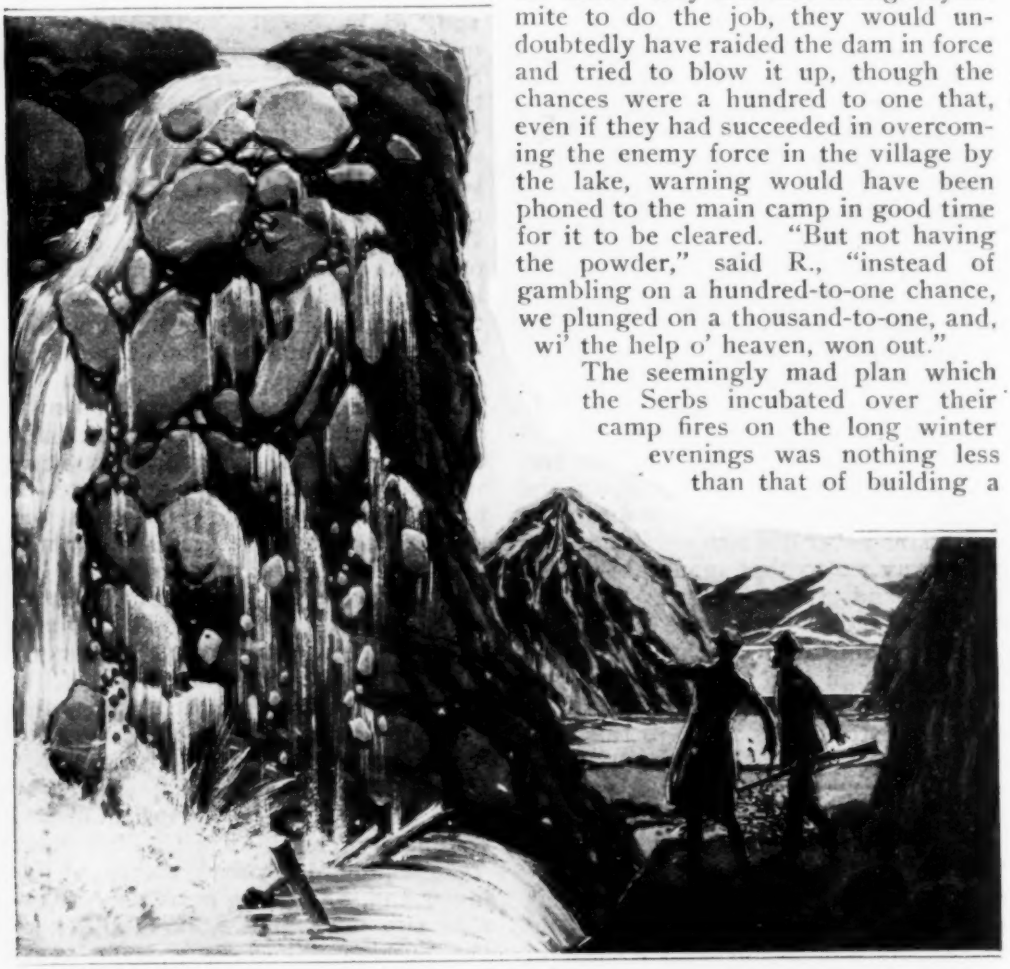
The mountain valley in which the band made its headquarters was completely walled in by precipitous and lofty mountains, the only break in which was at the lower end where the torrent which drained it broke out through a narrow gorge. This gorge was traversed by a rough cart road, but so steep were its sides that the band, even had it been without firearms, would have had no trouble in keeping the enemy back by rolling rocks. After falling over a thousand feet in a series of rapids and cascades, the torrent, a few miles farther down, broadened into a second valley, less wild and rocky than the one above, but still almost completely encircled with high hills. This valley, narrowing down at its lower end, offered an extremely favorable site for water storage, and here the Serbian government, some years previously, had started the construction of a dam to impound a lake which

could be drawn upon to irrigate the fertile plain, an arm of which ran up into the foothills.

A considerable part of the money appropriated for this dam found its way into the pockets of the Austrian contractors, and although the structure was raised to the full height called for in the plan, it had neither the foundation nor the shape to give it the requisite strength. A British engineer whom the government brought to inspect it reported that, until the inferior concrete used began to disintegrate, it would be reasonably safe to allow the water to rise within 50 feet of the top, but not higher. Even this level backed up a lake several miles in length and of considerable depth, and a scheme for distributing the water to the plain was under consideration in Belgrade at the outbreak of the war.

The Austrians, occasionally harassed by the Serbs from the mountains above, occupied all of this lower valley, and maintained a small force in the little village by the lake. Their main "containing" force against the mountain band, however, was in a large camp just where the river came out of the foothills to the plain. Here there was always a regiment or two, and they were the game that the undaunted patriots aspired to bag. R. admitted to me that if they had had enough dynamite to do the job, they would undoubtedly have raided the dam in force and tried to blow it up, though the chances were a hundred to one that, even if they had succeeded in overcoming the enemy force in the village by the lake, warning would have been phoned to the main camp in good time for it to be cleared. "But not having the powder," said R., "instead of gambling on a hundred-to-one chance, we plunged on a thousand-to-one, and, wi' the help o' heaven, won out."

The seemingly mad plan which the Serbs incubated over their camp fires on the long winter evenings was nothing less than that of building a



"In the course of the next day or two, the diverted stream which formed the cascade, tearing away all the earth beneath a thin stratum of slate . . . undermined the towering bulk of the cliff for a hundred yards or more."—*See page 171.*

short but high dam where their valley narrowed at the entrance of the gorge, backing up a lake of their own, and then, when the spring freshets were at their height, allowing it to overflow and burst in the hope that enough water would be thrown against the lower dam to cause that also to give way and turn loose a great wave to inundate the main enemy camp. "If any o' us had had the sense we was born with," R. observed at this stage in his narrative, "we'd ha' never tackled so crazy a stunt; but just because we was nothing more than fools we went ahead and—got away wi' it."

With no coal, no steam, no engines, no tracks or dump cars, no steel or cement, and only a few negligible sticks of dynamite; with no tools whatever save a few axes, picks, and shovels, there was little to differentiate the attempt by these besieged men to build, in two or three months, a hundred-feet-high, hundred-yards-long dam, sufficiently strong to back up a lake several miles long, from a similar undertaking launched by a tribe of savages of the Iron Age. In fact, the odds would have favored the savages, for they would not have been working against time, and they would not have been compelled to maintain a military defense against a far stronger and better organized foe during the generation, or so, they could have devoted to the job. Of course it was a sheer impossibility, and of course it was foredoomed to failure, and of course none but a band of desperate lunatics would have attempted, and—but it succeeded, that's all.

That crumpled, finger-marked, penciled plan—with its front and rear elevations and its cross sections—will be a treasure for the National Museum of Serbia if it still exists at the end of the war. It called for a huge crib of logs, as broad at the bottom as it was high, and sloping in from front and rear until it was about 50 feet wide at the top. Into this crib was to be dumped large bowlders to give the structure weight, while it was to be rendered waterproof by tamping the interstices between the stones with sand and clay. The finished dam was to have the shape of a rough frustum of a rectangular pyramid which had been bent slightly, the convex side, of course, being against the pressure of the water.

There was little risk of the enemy's scouts being able to reach any point on the rim of the valley from which they could observe the work from any angle that would give them an idea of its true character, and to deceive the still less advantageously placed observer in an aeroplane the crafty builders hit upon the clever idea of "camouflaging" the structure, as it progressed, into the seeming of a fort erected to defend the only practicable approach to their stronghold. An opening was to be left through the middle of the crib through which the river would continue to flow, and this was only to be closed when the rest of the structure was complete, and when the high water of the spring freshets would insure a rapid filling of the lake. Similitude was to be given to the "fort" effect by the running of conspicuous communicating and supporting trenches from both ends of it to the mountains on either side.

So much for the plan. R., because he had worked around mines and sawmills, was made "head lumberman" and intrusted with the task of cutting down the fir trees from a clump on an upper slope of the valley, and transporting the logs down to the dam site. There were several hundred hands available, and good progress was made with the cutting down and cutting up of the trees. It proved easy, too, to roll the trimmed logs down the sharply sloping grass-covered floor of the upper valley, but when it came to getting them over the big bowlders which were strewn thickly over a quarter-mile-wide belt above the dam, so little headway was made that it soon became evident that, unless some swifter means of "logging" was found, enough material for the crib could not possibly be brought down in ten times the two months in which it was imperative that the whole job should be finished.

It was at this juncture that R., who had evidently assimilated not a little

native Yankee ingenuity during his many years in America, suggested that such logs as were already available should be used to raise the dam to a height of 15 or 20 feet throughout its whole projected length, so that enough water could be backed up behind it to make it possible to float the rest that were needed across the submerged belt of bowlders. When an endeavor was made to carry this clever expedient into effect, however, the staggering discovery was made that—principally because there was insufficient clay available—the dam would not hold water. The torrent simply went right on flowing through the loosely stopped interstices between the bowlders, and absolutely refused to back up and form even enough of a lake to float logs on, to say nothing of starting a flood with.

"That fizzle," said R., "seemed to knock the bottom out o' our hull scheme, but, by cracky, it saved our bacon in the end!"

Tools were dropped in despair, and for two or three days nothing further was done. Then R., who had once been "nozzle man" in a hydraulic mine in northern California, bobbed up with a plan to fill in between the bowlders of the crib by sluicing down material from a towering cliff of decomposed granite which flanked the site of the proposed dam on the right. A good-sized cascade came rolling down into the gorge just below the dam, and this, R. figured, if deflected across the face of the cliff, would quickly bring down enough débris to fill the crib in a few days. Half of the band's precious little store of dynamite was used in blasting a channel through a narrow ledge of "bull" quartz that resisted all attacks by pick and shovel, but after this was ready, the diversion of the little stream was only the matter of a few days' digging. A new "head lumberman" was appointed to take the place of R., who had been made "chief hydraulic engineer" and ordered to rush the dam to completion according to revised plan.

To make assurance doubly sure, R. had, before inaugurating the work of diverting the stream, carried on some "preliminary experimental tests" by tamping a section of the dam with a few hundred basket loads of the decomposed granite from the cliff. These, he claims, vindicated his theory completely, the prepared section shedding water, as he put it, "like a greased gum boot." Unluckily, the decomposed granite was not affected in the same way by sluicing as by tamping. "There was nothing the matter wi' the way she tore down the dirt," said R.; "fact is, she was just about the sweetest lil' hydrolick you ever see. She took some directing, that lil' stream, but when I got her going right she was slinging slush at 50 yards a minnit. She'd a filled that crib in a day if the crib'd only held the stuff. Trouble was, she churned the stuff up so fine that it sluiced out through the cracks jest as fast as it sluiced in." Like so many other great conceptions, R.'s plan was perfect in theory but faulty in practice.

That settled it so far as the heroic little band of patriots was concerned. Now fully realizing the hopelessness of the titanic task their love of country and their hatred of their country's enemy had lured them on to attempt, they gave it up as a bad job and began preparing to go back to their raiding operations again. But the game was not quite played out. Man had had his fling, and lost; it still remained for Fate to have her throw.

It was well on into the spring by this time, and equinoctial storms of great violence began setting in on the very night that the disheartened Serbs desisted from their bootless labors. The warm rains, playing onto the accumulated snows of the long winter, turned the river into a torrent, and on the following day its rising waters carried away in an hour the crib of logs and most of the other evidences of three months' work. Only the zigzag lines of the "fake" trenches and a swollen cascade, hourly eating its way deeper and deeper into the heart of the great cliff at the right of the entrance to the gorge, were left.

"Probably no one survived to tell the tale of how the Austrians met their end, but the Serbs believe that a good many more than the single regiment . . . . . perished."

In the course of the next day or two, the diverted stream which formed the cascade, tearing away all the earth beneath a thin stratum of slate which cut its angling way athwart the face of the cliff at this point, undermined the towering bulk of the latter for a hundred yards or more. That night the whole face of the cliff collapsed with a mighty roar, and in the morning the wondering Serbs saw a great slide forming a natural dam all the way across the mouth of the gorge on the identical site they had chosen for their own, with a rapidly spreading and deepening lake backing up behind it. In two days more the flood from the rain and melting snows had formed a body of water twice the volume of that which could possibly have been impounded by the completed dam, upon the beginning of which so much useless work had been expended.

The abnormal amount of flood water coming into the river in the gorge below the slide kept that torrent of a sufficient volume to prevent the Austrians in the village by the lower lake from noticing that the main flow had been completely cut off. But although Serb scouts brought back word that there was no sign of alarm among the enemy, the band decided that it would not do to tempt a propitious Providence too far by waiting another three or four days to allow their lake to fill up and carry away the slide on its own account. They had nothing like enough dynamite to start the obstruction going, and so, for the last time, the Serbo-Yankee "hydraulic engineer" was called upon to submit an "emergency plan."

"It was like taking candy from a kid," said R. in telling me about it. "There was my lil' baby cat'ract boil'ing right down behind the big dam it had made all by its lonesome. All I had to do was to turn her right 'long the top o' the dam, and the thing was as good as done."

R.'s "lil' hydrolick" sluiced away the whole lower side of the slide in a part of an afternoon, and shortly after dark, with a roar that shook the whole valley, it went out from bank to bank. The lake was completely drained before a still deeper roar from a distance gave sure indication that the lower dam had also gone out in its turn, and that a mighty wall of water was rushing down upon the doomed camp at the edge of the plain. Probably no one survived to tell the tale of how the Austrians met their end, but the Serbs claim to have good reason for believing that a good many more than the single regiment which the official bulletin from Vienna admitted had perished in "a flood caused by the breaking

of an old dam in the mountains" will never come against their valley stronghold again.

"The Austrian papers," said R., "spoke of the d'saster as an 'act of God.' And so it was. But it's dern good cons'lation fer a feller to savvy that he had a finger in that same 'act' hisself."

R., suffering from a bad attack of scurvy—the result of a lack of fresh vegetables—made his way across to the Adriatic the following fall, and ultimately reached Corfu. It was at the end of his convalescence here that I met him. I saw him several times later at Saloniki, and finally in Macedonia, where he had been rewarded with a commission and was fighting with the First Serbian Army.

WATER WHEEL RINGS SIGNAL BELL FOR LOCK KEEPER

With an improvised water wheel and an old locomotive bell, the keeper of Lock 12 on the Chesapeake and Ohio

When the Spillway Fills, the Water Wheel Turns, the Bell Rings, and the Keeper of the Next Lock is Signaled

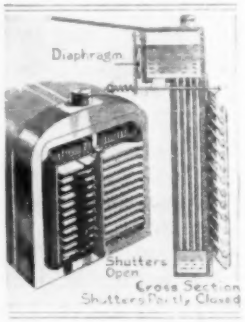
Canal has contrived an automatic signal that informs the caretaker of Lock 11, immediately below, when a boat starts through the former waterway. When the gate is closed, the spillway, in which the wheel is installed, fills and supplies the power that rings the bell. A wire connects the latter to the crank arm of the water wheel.

SOLDIERS AND SAILORS CLUBROOM IN DEPOT

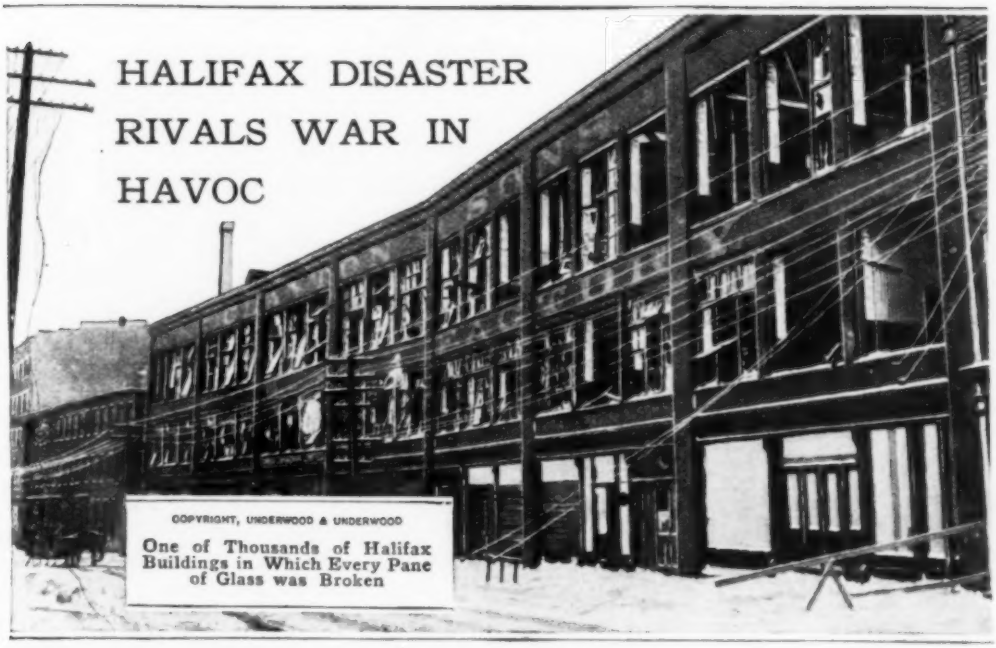
A new feature for railway terminals, incidental to our participation in the war, is a clubroom for sailors and soldiers that has been opened in the Chicago and Northwestern railroad station, at Chicago. This building contains large rooms that had been set aside for immigrants, but since there is practically no immigration at the present time, they have been transformed to meet an urgent need of the "Sammies" and "Jackies." Easy chairs, reading and writing tables, magazines, and phonographs have been installed here by the railroad, giving the fighting men, thousands of whom use this line, a down-town recreation center of the most attractive sort. A special feature is a laundry equipped with tubs, and driers in which garments can be dried in a few minutes. Shower baths are also provided for the men.

SELF-OPERATING RADIATOR SHIELD FOR MOTOR CAR

For northern motor cars particularly, a thermostatically controlled radiator shield has been developed that regulates the introduction of air so as to maintain the engine temperature at the proper point for efficient operation. Metal shutters cover the front of the water tubes and are connected to a wafer-type thermostat installed on the rear side of the tank. As the temperature of the water changes, the shutters are automatically adjusted. The appliance obviates much of the trouble ordinarily encountered by motorists during winter months, and need not be removed in summer.



HALIFAX DISASTER RIVALS WAR IN HAVOC



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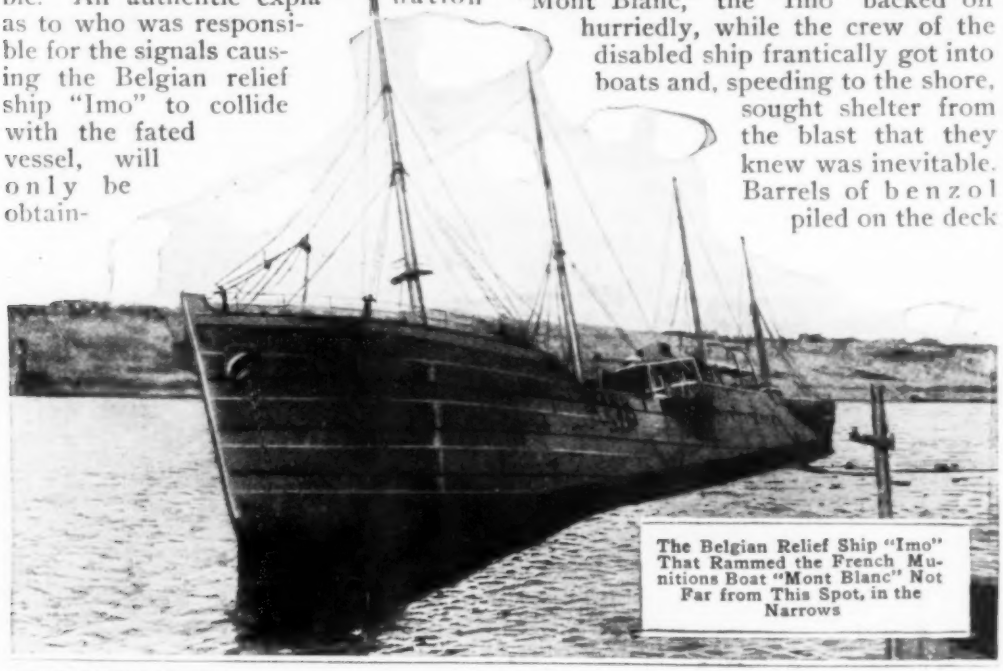
One of Thousands of Halifax Buildings in Which Every Pane of Glass was Broken

In the disaster that followed the blowing up of the rammed French munitions ship "Mont Blanc" in the narrows at Halifax, that seaport has suffered a misfortune incident to the great war, scarcely equaled by the destruction wrought in parts of Europe where the conflict has been most terrible. An authentic explanation as to who was responsible for the signals causing the Belgian relief ship "Imo" to collide with the fated vessel, will only be obtainable when official investigations are completed. It may be that even then the question as to whether enemy forces were secretly at work to bring about this holocaust will not be fully answered.

Following the collision, in which a great gash was cut in the side of the "Mont Blanc," the "Imo" backed off hurriedly, while the crew of the disabled ship frantically got into boats and, speeding to the shore, sought shelter from the blast that they knew was inevitable. Barrels of benzol piled on the deck



The Belgian Relief Ship "Imo" That Rammed the French Munitions Boat "Mont Blanc" Not Far from This Spot, in the Narrows

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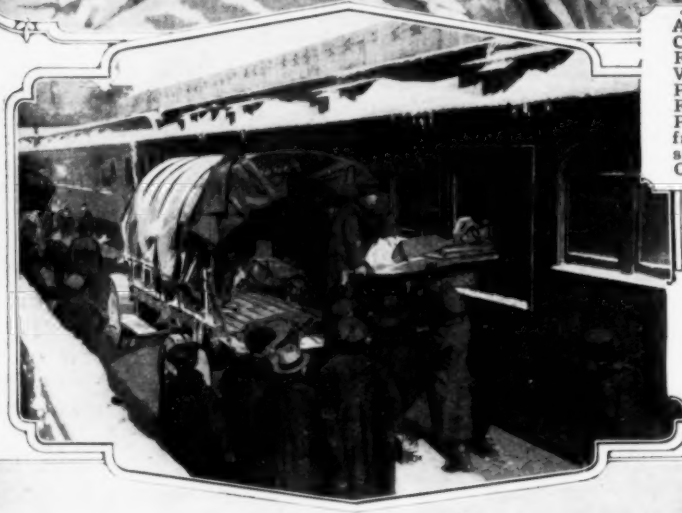
A General View of the City's Desolated Water Front: "Many Times Worse and Far More Pathetic Than a Battle Field in France" Is the Phrase Used by a Veteran from the Trenches to Describe the Plight of the Once Thriving Seaport



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Left: Loading the Injured into a Canadian Military Hospital Train Which, Thanks to the Dominion's War Efforts, Was Ready for the Emergency

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Canadian Soldiers Searching for Bodies in the Ruins of Residences: When the Havoc Caused by the Explosion and Fires Was Complete, a Storm Added to the Horror by Covering All with Ice and Snow

All That Remains of the Railway Station in Which 60 Perished: A Blizzard, Effects of Which are Seen Here, Swept over the City a Few Hours after the Explosion, Blocking Relief Trains That were Rushed to the Scene and Adding Much to the Terrible Suffering

Rows of Military Tents in a Common, Sheltering Some of the Thousands Made Homeless and Penniless

A Steeple, Which by a Strange Chance Escaped Destruction, while the Church Itself was Razed: Frame Buildings Proved Less Able to Withstand the Explosion Than Those of Brick or Stone

had been crushed and this fluid, mingling with quantities of picric acid in the first hold, burst into flames. About 17 minutes later the fire, spreading to other parts of the ship, reached holds containing tons of trinitrotoluol, one of the very powerful explosives used in this war. No words can describe the detonation that followed, shaking a vast region like an earthquake.

The most complete destruction wrought covered an area of about two and one-half square miles of the city which overlooked the harbor and narrows. Here thousands of homes, and public buildings, including schools and churches, most of them frame structures, crumpled like houses of cards, crushing those within. Fires immediately sprang up, completing the destruction and adding greatly to the loss of life. Months may be required to ascertain the exact extent of the losses. A week's search amid the ruins left 1,920 persons unaccounted for, while the known dead numbered 1,280. The damage to property is estimated at $25,000,000 to $30,000,000. The rescue work, in which Canadians and Americans shared heroically, was terribly hampered by a series of blizzards that swept over the desolated city, making pitifully ineffective the shelter offered by the windowless houses left standing, and the tents which were hastily erected.

OLD-TIME KNITTING MACHINE COMES TO THE FORE

To two Cincinnati sisters belongs the distinction of having knit during their spare time 170 pairs of woolen socks for the boys "over there." Their work is particularly interesting because it is done on an old-fashioned knitting machine resurrected from the attic after 20 years of disuse. With it they turn out a pair of men's size socks in 47 minutes.

A Pair of Warm Woolen Socks in 47 Minutes Is the Working Record of This Old Knitting Machine after Years of Disuse

NEW VESSEL IS WRECKED ON TOP OF OLD ONE

By a strange coincidence, the new $1,000,000 oil tanker which recently came to grief on the breakwater at Tampico, Mexico, was wrecked squarely on the top of another steamer that was lost on the same spot several years ago. So exactly was the new vessel placed over the other that its boiler room was pierced by the boiler room of the older craft. The wreck occurred when the captain, unable to obtain a local pilot on account of a storm, attempted to enter port on his own calculations. The disaster serves to emphasize the danger of dispensing with the service of a local pilot when entering a harbor. It was estimated at the time of the accident that the new vessel, valued at $1,000,000, would become a total loss. A loss of this kind is very keenly felt in these days in particular, when vessels of all kinds have practically doubled in value.

HOW COLOSSAL LIVING FLAG WAS BUILT

PHOTOGRAPHS of the wonderful living flag recently displayed at the Great Lakes Naval Training Station have been widely distributed, but few have any conception of how the masses of men were arranged to present the banner in perfect perspective, even to the "wave" in its folds. The work was executed by Mr. Arthur Mole, a young photographer of Zion City, Illinois, assisted by Mr. John D. Thomas. This difficult form of photography is the result of years of experimentation and study.—Editor.

OLD GLORY lived and breathed several weeks ago when 10,000 American boys, apprentice seamen at the Great Lakes Naval Training Station, gave form to a most remarkable national ensign. Built with the bodies of the Sons of Freedom, the flag was one of overwhelming inspiration and meaning. As no banner before has done so eloquently, this one visualized the often quoted axiom: "In union there is strength."

PHOTO BY MOLE; COPYRIGHT BY GREAT LAKES RECRUIT

On the Extensive Parade Ground at the United States Naval Training Station, Great Lakes, Illinois, 10,000 Bluejackets Gave Form to a Glorified and Inspiring American Flag of Stupendous Proportions

Aside from its human interest and grandeur, the flag as preserved is an exceptional example of mathematical photography. It was planned in strict accordance with the laws of perspective and involved a great amount of delicate work that had to be executed with the utmost accuracy. This is best understood when it is remembered that three men standing near a camera will occupy as much space in a picture as 100 men photographed at a distance of 100 yards. Furthermore if one describes a circle on the ground and photographs it, the figure will appear oval. Given an oval, however, the reproduction will be circular. These are important details that had to be given careful attention in constructing the human flag in front of the camera fixed at a measured point above and in front of it.

To guide the men while they maneuvered to produce the proper formation, strips of white tape were laid on the parade ground. They formed a pattern that bore no resemblance whatever to a flag but had dimensions mathematically harmonious to the law of

perspective. When one looks at the photograph it is difficult to realize that in real life the emblem measured from top to bottom at the right end 128 ft., while the corresponding side of the blue star field, which does not seem half so long, was actually 184 ft. in length. It is also interesting to know that in order that the ball at the end of the pole might appear circular, 250 men were grouped in an oval that was 237 ft. long and 20 ft. wide. The staff was 550 ft. in length, 3½ ft. wide at the base, 6 ft. across the upper extremity, and made up of 700 individuals.

Some of the other figures are equally bewildering. While measuring 293 ft. along the top margin, the banner at the bottom was only 73 ft. in length. On the left side it was 428 ft. as compared with the previously mentioned 128 ft. for the outer line. The top of the field was 143 ft., bottom 66 ft., left side 350 ft., and right side 184 ft. The star in the upper left-hand corner of the field required 126 men, while only 12 men were needed for the one in the lower right-hand angle. Sixteen hundred men formed the white stripes; 1,900, the red ones; 1,800, the stars, and 3,100, the field. These, plus 950 sailors constituting the pole and its ball, brought the exact total to 9,650 men.

It required slightly more than an hour to put all of the men in their respective places. Then a bugle called "attention" and every bluejacket stood erect and motionless. The second order was "salute," and mechanically every arm was raised. The camera, situated 175 ft. in front of the flag at an elevation of 60 ft., clicked. In that split second the picture, without question the greatest of its kind, was made.

"TROUBLE" TRUCK OPERATED BY ONE MAN

Special features have been incorporated in a "trouble" truck owned by a large automobile concern, which make it possible for one man to operate it alone, loading and unloading disabled machines of any size. The extra-long platform of the car body is supported above the back axle by pivoted uprights that permit the rear end to be tilted downward, the front end being raised or lowered by a ratchet lever by hand. Extensions are provided to be attached to the rear of the platform to make the incline extend all the way to the ground. A cable wound on a motor-operated winch is employed to pull the load onto the car. The body of the motor truck is equipped with removable side gears.

GOLD BAR SHOULDER DEVICE FOR SECOND LIEUTENANT

Hereafter second lieutenants will wear a gold bar on each shoulder strap and brown-braid loops on overcoat sleeves to distinguish them from enlisted men. Confusion has been so widespread that an order creating these insignia of rank has been authorized by Secretary Baker.

Automobile Company's Repair Truck So Designed That One Man Can Operate It, Loading and Unloading Machines of All Sizes

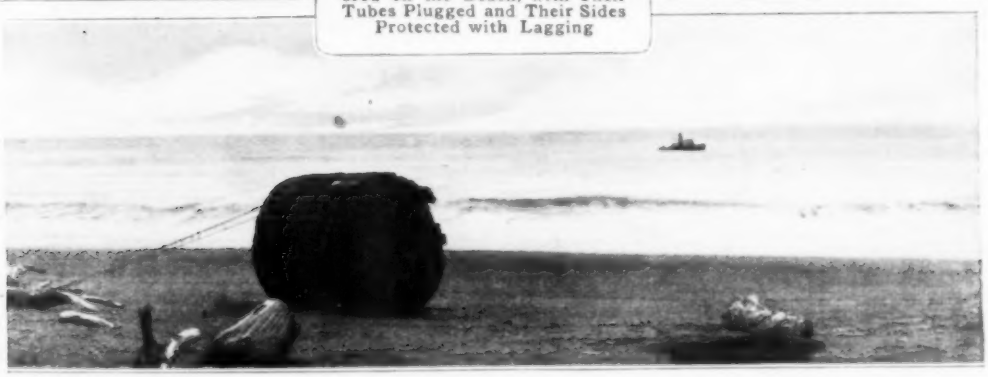
SHIP'S BOILERS SALVAGED AFTER WEST COAST WRECK

Horses Pulled the Heavy Boilers to a Point Where They could be Floated and Towed to Port

Derrick Specially Rigged for Hoisting the Boilers from the Ship

The Steamer "Bear," Broken Completely in Two Amidships, Fast on the Sands

Some of the Big Boilers Anchored on the Beach, with Their Tubes Plugged and Their Sides Protected with Lagging



Waiting for the Tug: One of the Boilers Ready to be Floated and Towed to Eureka, California, the Nearest Port, There to be Loaded for Transportation to Shanghai, China

After the steamship "Bear" was beached on the Pacific coast near the mouth of Bear River and pounded to pieces by the breakers some time ago, attempts were made to salvage as much of the wreckage as was valuable. Among other things the vessel's six boilers, each weighing 51 tons, were recovered. Before being hoisted from the boat by a specially built derrick,

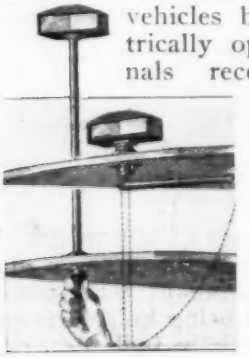
the boilers were protected with plank lagging and the tubes plugged. They were then pulled along the surf to a point where they could be floated and towed to Eureka, Calif. Subsequently they were loaded for transportation to Shanghai, China.

TROUSERS ARE BIG ENOUGH FOR TWO MEN AT ONCE

Along with routine orders received by a men's tailoring establishment, which has made thousands of garments, there came recently an order for a pair of trousers whose dimensions made the workers fairly gasp. The waist measure was 66 in.; seat, 70 in.; thigh, 44 in.; knee, 33 in.; in-seam, 29 in., and out-seam 44 in. Six yards of cloth, 30 in. wide, was required to make this article of apparel, and when it was completed two ordinary-sized men were able to get into it at once. The garment was made for a man living in the middle West.

ELECTRIC COLOR SIGNALS IDENTIFY AUTOMOBILES

Automobile owners may instantly locate their cars among any number of vehicles by means of electrically operated color signals recently introduced. Each motorist has his own distinguishing combination of colors which may be raised aloft on the roof of the car when it is being sought from among others.



NAVAL AIR SERVICE NEEDS MECHANICIANS

The Navy Department has recently issued a call for 8,000 young men who, after proper training, will become a part of the ground personnel of the aviation branch, thereby opening up a most attractive work for the skilled mechanic and an opportunity for backing up the navy's "birdmen" that should appeal to all patriotic young men with the proper experience. There is an immediate need for mechanicians for the ratings of machinist's mate, carpenter's mate, quartermaster, coppersmith, and blacksmith. These men will not be enlisted for pilot's duties but will receive special training for the building, handling, and repairing of the navy's air craft. Succeeding in this, they will be used for the ground personnel of the flying corps. The age limits for this enlistment are 21 to 35 years.

WOODEN SHOES CLIP-CLOP ON PARIS BOULEVARDS

Among the current Parisian modes in footwear are wooden sabots of trim, rather surprising lines. Although necessarily an extreme fashion, their purpose fundamentally is to conserve leather, much needed by the boys in the trenches.

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¶A government order which has heretofore excluded motorcycles from the Yosemite National Park has been rescinded by the secretary of the interior. Regulations governing the use of motorcycles are to be issued.

DODGING "ARCHIE" AND CHASING "FRITZ"

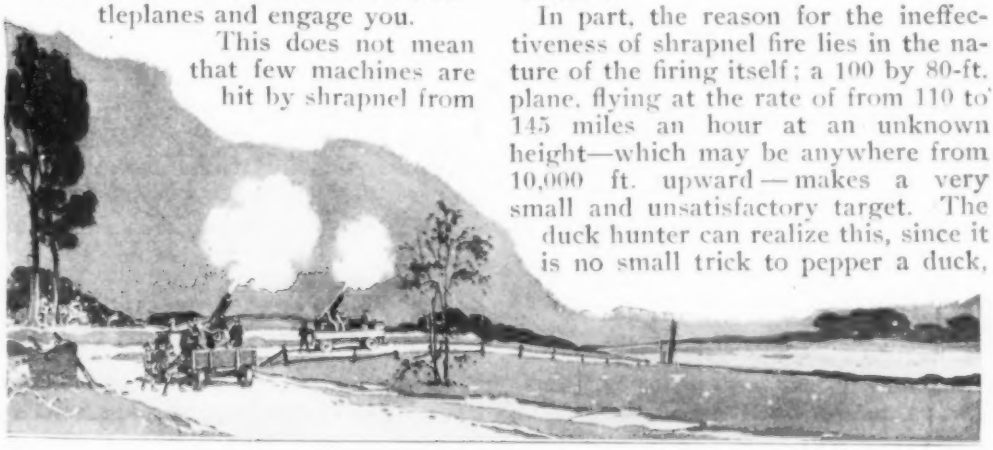
"A 100 by 80-foot plane, flying at the rate of from 110 to 145 miles an hour, at an unknown height, makes a very small and unsatisfactory target."

By E. T. BRONSDON

"ARCHIE": The name given by the Escadrille Lafayette and the Royal Flying Corps to antiaircraft shrapnel.

"Fritz": The name of every German soldier—according to the rank and file of the allied armies—whether he be Von Hindenburg himself, or the amateur air scout who comes wabbling over to photograph the British batteries.

"Archie" is not really feared. His main purpose is to rattle you when you are new at the game, and keep you from getting the pictures you are flying over the German lines to get, until "Fritz" can rise in one of his own battleplanes and engage you.



This does not mean that few machines are hit by shrapnel from antiaircraft guns; almost every machine that does any extended observation work ha. bullets taken out of it every week. The bullets, unless they happen to hit the airman himself, do almost no damage, however. The casualties to airmen resulting from this cause directly are very slight, also. Out of the total number of machines flying daily on the side of the allies—in August, 1917, this was slightly in excess of 6,000—20 per cent are destroyed yearly, with a casualty list of one-half the airmen required to fly this number. The 600 airmen who lose their lives die mostly in actual air combat with enemy planes; only an average of 40 a year are accounted for by "Archie."

In part, the reason for the ineffectiveness of shrapnel fire lies in the nature of the firing itself; a 100 by 80-ft. plane, flying at the rate of from 110 to 145 miles an hour at an unknown height—which may be anywhere from 10,000 ft. upward—makes a very small and unsatisfactory target. The duck hunter can realize this, since it is no small trick to pepper a duck,

flying 40 miles an hour and only 50 yards, or so, away. The wind deflection and the allowance for speed is very great in this homely instance; how much more so when the distance increases to two miles and the speed to two miles a minute!

The rest of the reason for the failure of "Archie" lies in the cleverness of the airmen themselves. At first, when shrapnel began cutting through the planes they used to "bank"—that is, they would turn sidewise toward the gunner and try to rise out of range, offering as small a target as possible in the meantime. Of course the gunners could see this; they would know they had the range, and would concentrate the fire from all their guns on one plane, usually with disastrous results to the airman.

Then came a development which was not so easily detected. The flier allowed his plane gradually to become foreshortened by pointing the nose up and presenting the tail toward the feared gunner. This was better, but still the man below, if he watched closely, could tell that his shots were causing worry.

Finally the Royal Flying Corps developed what is now known as the invisible turn. In this the rising planes are set to make the machine rise at a slight angle, the motors are speeded to 1,450 revolutions a minute, and the rudder is allowed to swing around any way it wishes for a minute. Then it suddenly is turned to the left by a kick of the airman's foot, held in that position for a few seconds, and then released. The operation is repeated as many times as seems necessary.

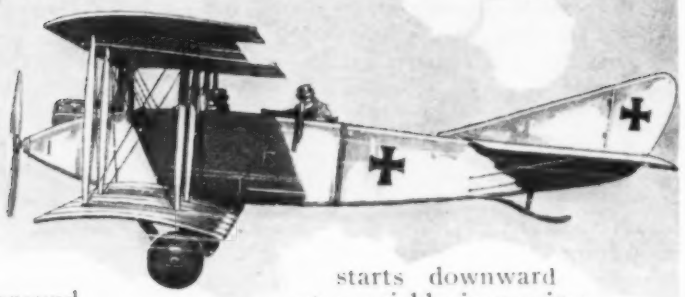
This maneuver results in the plane pursuing a zigzag course, though always upward. The turns cannot be seen well from the ground; the gunner is apt to think only that "bumps in the air"—pockets of semivacuum—have been encountered. The aviator soon gets from 50 to 100 yards away from the troublesome fire, zigzagging as he goes, and the chances are over one hundred to one in his favor.

When "Fritz" comes out in his plane to fight, nowadays, he is both puzzled and at a big disadvantage. Until just recently it used to be to the interest of both fighters to strive for the top position. That is, because of the mounting of the machine guns, firing downward from above was the only method possible to use except the straight-ahead variety which was accomplished by using a machine gun geared to fire through the propeller. Above and behind were "blind spots"—places where the enemy might be seen but not fired upon.

A short time ago "Fritz" was astounded to find that the planes he tried to outmaneuver actually tried to let him get the top position! Of course he took it, and started his cumbersome downward fire, which always was difficult. Imagine his surprise when he, instead of firing with impunity, met a terrific hail of machine-gun bullets coming upward from the allied plane!

This surprise was engineered by a Canadian major, experimenting with the placing of machine guns on one-man planes. Besides the machine guns pointing forward and down, he tried placing a Lewis gun on the edge of the plane above the airman's head. This, too, pointed forward, but it was fastened to the plane so that whenever the aviator got below an enemy all he had to do was to grasp the breech of the Lewis gun, adjust the magazine, pull it to the perpendicular, and commence firing. This placing gave such a freedom of fire that now it is the favorite with almost all the allied air fighters.

Another innovation recently introduced has improved the efficiency of air combat. When a flier gets into hot quarters nowadays he can forget all about running his machine and devote himself exclusively to demolishing or destroying his enemy. This startling device is a logical outgrowth of the many automatic stabilizers and control devices which have made flying simple instead of simple suicide. It consists merely of a set of lever locks which the airman can adjust in five seconds or less. These locks hold all the controls rigid except the automatic stabilizers;



when set, the airman has from five to ten minutes' leeway in which he can climb around anywhere he desires, and fight to best advantage.

This device also is very useful in allowing a scout airman to get exactly the photographs he was sent out to obtain. In the past this was not easy, because so much attention had to be devoted to the airplane itself, but now, unless "Fritz" bothers too much, pictures are simple to obtain.

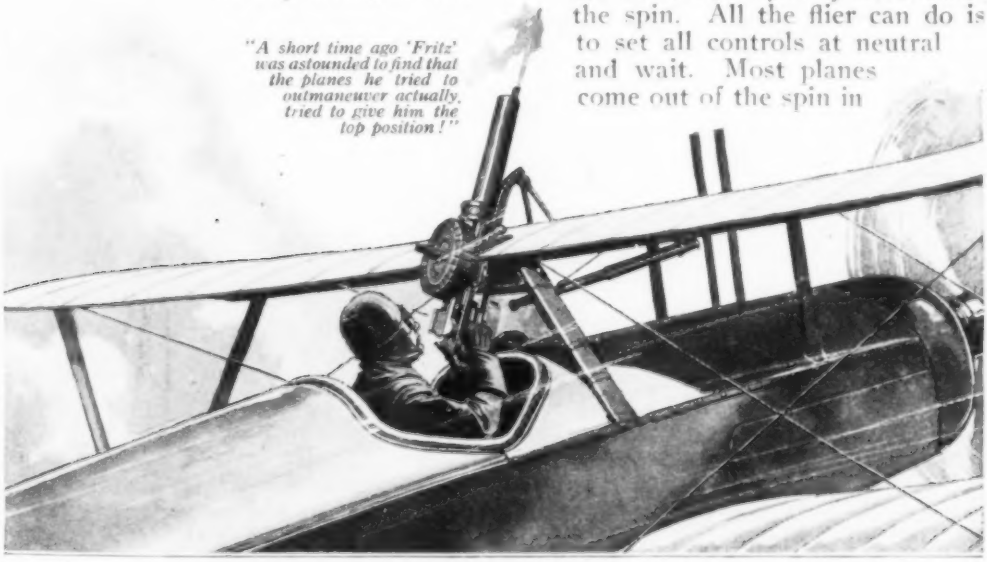
Of course, if the flier lets his machine run on and on with the controls locked, something is bound to happen sooner or later. The most dangerous accidents of these are the back-slip and the nose-spin.

In the case of a back-slip, something halts the forward progress of a plane which has its levers set for mounting. This may be a wind squall, the missing of the motor, or several other causes. In any event, the tail starts downward at a quickly increasing rate of speed. In order to save himself, the airman removes his locks, and then just waits. His sensations are similar to those a person would experience sitting backward in the seat of a car descending a steep scenic railway—only more unpleasant.

All machines for war use are made with a heavy nose, however, so after the craft has fallen 300 feet or less, the nose points downward in a dive. Then all the pilot has to do is to work his controls, right his plane, and go blithely on his way again.

The spinning nose dive is the real air bugaboo, because when his machine goes into this accident the airman can do little else but pray. The nose is pointing down and the planes are spinning around horizontally like the ball arms of a machine governor. Controls are useless; they only accentuate the spin. All the flier can do is to set all controls at neutral and wait. Most planes come out of the spin in

"A short time ago 'Fritz' was astounded to find that the planes he tried to outmaneuver actually tried to give him the top position!"



from 300 to 1,000 feet. If they do, then all that is necessary is to work the lift planes and bring the nose up. If they don't—well, there's no use talking about it.

MACEDONIAN CHILDREN LUG WATER BUCKETS WITH EASE

Amateur mechanics in Macedonia have long known that buckets or cans of water, when suspended from a hoop held in both hands so as to encircle the body, can be carried by a small boy with less effort than by a grown man who has no other equipment than his hands and arms. By walking inside of the ring, the energy that otherwise would be expended in holding the weight free from the body is saved.

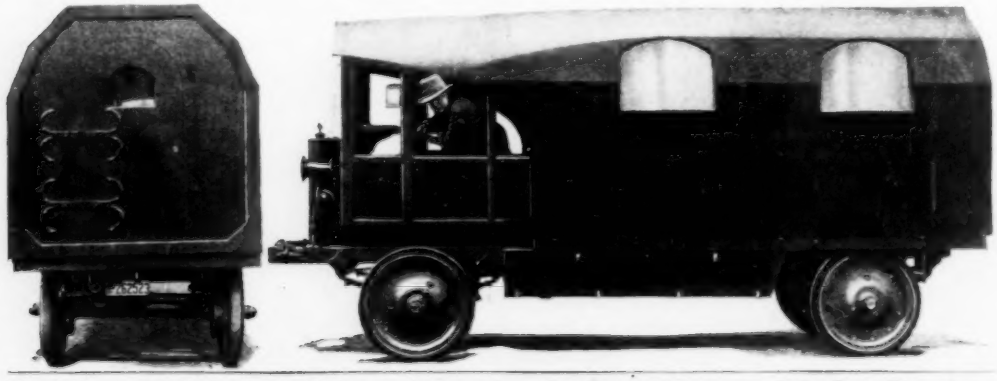
Walking Inside of the Hoops, Which Hold the Water Containers Free from the Body, These Small Boys Cover Ground as Rapidly as the Man at Their Side

NEW POWERFUL WIRELESS OUTFIT FOR AIR CRAFT

The effectiveness of aeroplane scouting may be increased tremendously if reports regarding a new wireless apparatus for air craft are correct. It is said that during a test a scouting plane equipped with one of the new sending outfits, while flying at a height of 6,000 ft., transmitted a message to a station 20 miles distant. So powerful was the new receiver employed, that persons 50 ft. from it were able to take the message. Such apparatus should prove invaluable in the midst of the roar of battle.

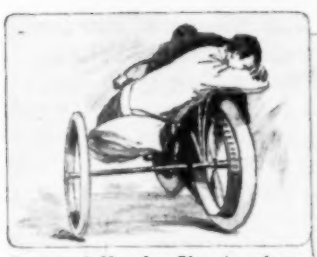
MOTOR TRUCK HAS CABIN HEWN FROM REDWOOD LOG

In a palatial cabin motor truck, the body of which is hewn from a huge redwood log, a man and his wife are now touring the United States. The body of the car was made by the owner in a California forest from a 22-ft. section of a 360-ft. trunk. After being chiseled out until the walls were but 12 in. thick, the shell weighed three tons. This weight was further reduced by seasoning. No nails or other hardware enters into its construction. The cabin is provided with all the comforts of home, including a kitchenette, beds, and even hot and cold running water. The occupants are wholly independent of trains and hotels.

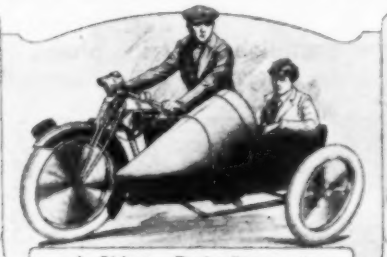


The Cabin of This Palatial Land Schooner is Hewn from One Piece of Redwood. Left: Rear View of the Huge Vehicle, Showing the Unit Construction of Its Cabin

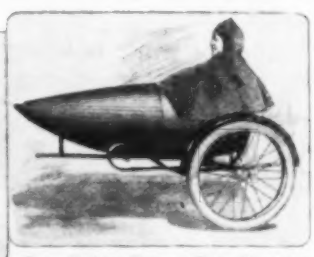
SIDECARS DESIGNED FOR BRITISH CONTESTS



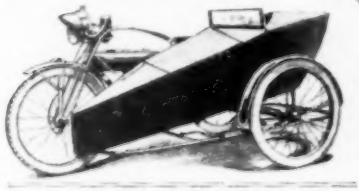
Designed Not for Sleeping, but to Reduce Head Resistance

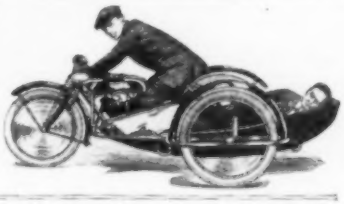


A Sidecar Body Suggestive of a Hollander's Sabot



For Rainy Days, This Pattern Seems to Have Its Advantages





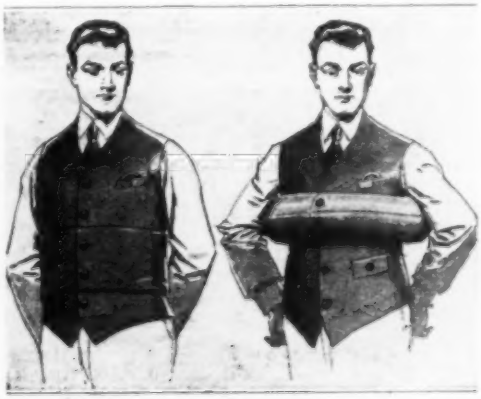
IN view of the purpose for which it was built, the body in the lower left-hand corner is merely queer, while the one in the center, and particularly that at the extreme right, do not hide the fact that they are meant to lessen wind resistance. In all cases freak, and in a few instances advantageous, designs have been attained. Speed and power being the all-important considerations, appearance and comfort have commanded little attention. The sidecars were constructed for hill-climbing and racing contests.

BEWILDERING APPARITIONS THAT SAIL WAR-TIME SEAS

Never before have the seas borne such strange craft as now call at different Atlantic ports day after day. So grotesque and color-crazy are some "camouflaged" vessels that one cannot help wondering what sort of a tale would be told were a war-ignorant seafaring man of the old school to sight one in the course of a long voyage. Particularly would the salt-seasoned yarn accelerate in interest at the point in which the phantom ship suddenly becomes enveloped in a heavy white cloud that rolls into view across the boundless blue. Smoke screens are now used regularly in the danger zones to hide ships from view. The white ones are produced by burning phosphorus and forcing the smoke ahead with pumps so that it spreads out like gray fog. Other vessels carry perforated crates filled with chemicals that ignite and form a dense yellowish smoke when they are thrown overboard. Either method produces a very effective smoke screen.

VEST HAS INFLATABLE LIFE BELT

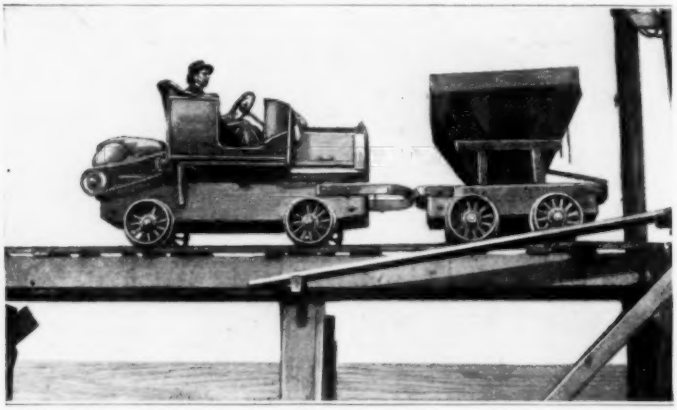
A vest, now being offered for sale in men's clothing stores, is provided with a life preserver which, when deflated, extends around the waist like a broad flat belt so that it is inconspicuous and causes the wearer no discomfort. At a moment's notice it can be inflated sufficiently to support the body of a man in the water.



A Life-Saving Vest That can be Worn Constantly: Deflated, the Belt Attracts No Attention and Causes No Inconvenience

FLANGED-WHEEL AUTO AIDS CONCRETE CONSTRUCTION

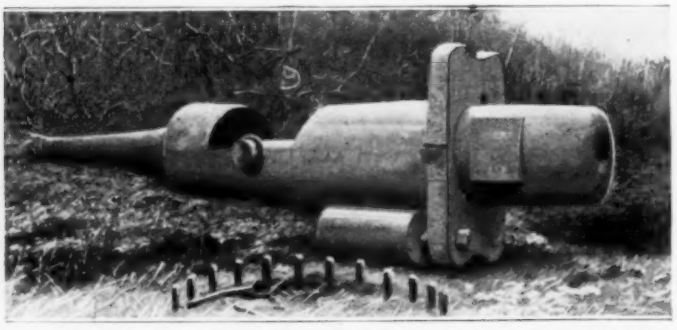
Speedy work is being accomplished by a contractor building a dam across a western river who has substituted a flanged-wheel auto and dump car for the old and laborious man-and-wheelbarrow method of handling concrete. The dump car, holding one cubic yard, is pushed over the spillway of the dam a distance of 350 ft. on a narrow-gauge rail line. The round trip is made in less than two minutes.



The Flanged-Wheel Auto Pushing Dump Car Loaded with Concrete for the Construction of a Dam

AUSTRIA'S BIG DUMMY GUNS INGENIOUS CAMOUFLAGE

It appears that the Austrians are adept at camouflage. A type of dummy gun used with success for some time at least indicates artfulness. The piece, constructed of wood and sheet metal, is a good imitation of the businesslike "305." Its ingenuity was discovered during the Italian offensive prior to the triumphant Teutonic drive. When airmen discover that a "big gun" doesn't belch smoke and recoil occasionally, they suspect a hoax. Last August scouts flying beyond the Isonzo reported more Austrian guns in action than was consistent with the number of shells landing within the Italian lines. Subsequently many dummy cannons that burned calcium charges and recoiled mechanically at the touch of a button at a central control station were captured. They had been painted with protective colors and hidden with bough screens.

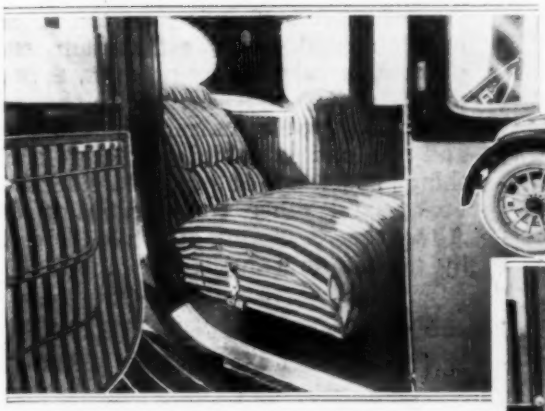


An Interesting Bit of Camouflage: Part of One of the Big Dummy Guns Successfully Used by Italy's Enemy

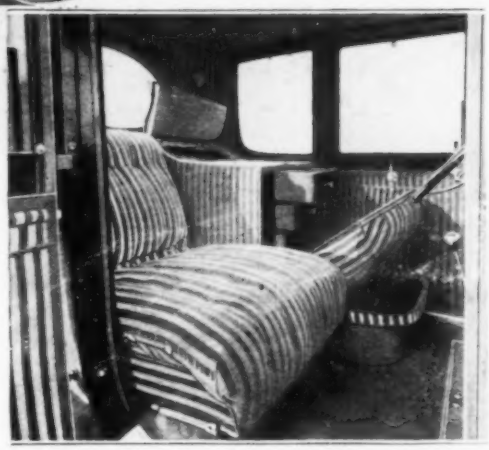
IMPORTANT FEATURES FOUND IN NEW HARD PORCELAIN

As a result of extensive research work carried out by a British school of science and technology, a new type of hard porcelain has been evolved. Only English materials are used in the composition which, it is reported, pots like, and costs no more than, ordinary earthenware. Unlike some of the hard porcelain produced on the continent, the new product takes ordinary colors satisfactorily so that the matter of decoration presents no difficulties. The leadless glaze is only a tenth as expensive as ordinary earthenware glaze.

¶A Swedish inventor is reported to have devised satisfactory means for transferring electrical power to self-propelled motor plows and other farm machinery.



The Exterior of the Physician's Car: The Doors Are Extra Wide



This View Shows the Adjustable Cushion Drawn Forward. The Seat in Front, That can be Let Down to Complete the Bed, is Not Shown

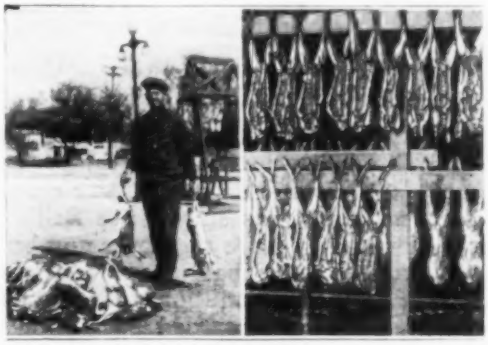
Beyond the Seat is Shown the Convenient Set of Drawers and the Pocket behind Them

PHYSICIAN'S CAR EQUIPPED TO SERVE AS AMBULANCE

To meet the requirements of a physician who wished to be able to use his car as an ambulance in an emergency, as well as for town or country driving, a well-known motor-car concern has built an automobile with a special Victoria body, the broad two-passenger seat being made adjustable so that it can be transformed into a bed. The bottom cushion of this seat is mounted on parallel rods on which it can be slid forward, at the same time drawing the back cushion into a slanting position to serve as a pillow. The bed is completed by turning down a small seat hinged to the dash, making a continuous flat surface about five feet long. The cushions of the driver's seat, when removed, give access to a convenient set of drawers concealed behind the back, while to the rear of the drawers is a pocket for larger articles.

EXPLOITING WILD RABBITS A PROFITABLE INDUSTRY

War-time conservation of beef and pork has enabled a Kansan to develop a rather extraordinary business in the marketing of wild rabbits, both jacks and cottontails. A rabbit-packing plant has been established and is now shipping frozen bunnies by the tens of thousands. A recent contract called for 480,000 lb. of jack-rabbit meat. The jacks average 4 lb. each when dressed. This means that approximately 120,000 rabbits were required to fill the order. The fur is disposed of at a handsome profit. It is used in the manufacture of high-grade felt such as enters into the making of men's hats. All waste products are converted into fertilizer. The industry also rids the country of a crop-destroying pest.



After being Dressed the Rabbits are Frozen and Shipped to Markets throughout the Nation. Left: A Hunter Who Helps Supply the Packing Plant with Rabbits

BOAT'S ICY COAT TELLS OF BATTLE WITH COLD

One of the vessels caught in the open sea by the bitter cold wave that came so suddenly a few weeks ago was

A Fishing Schooner as It Appeared on Its Recent Arrival in the Port of Boston: The Picturesque Mass of Crusted Ice Tells of a Battle with the Elements

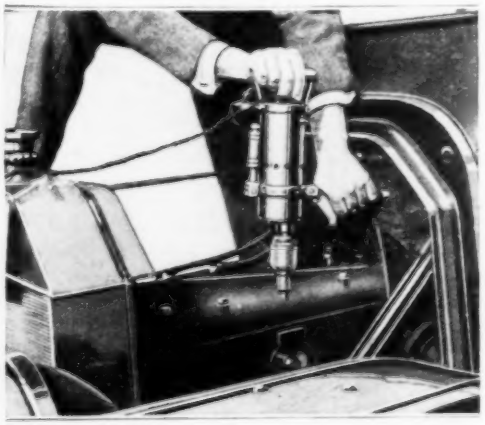
the ice-laden fishing schooner shown herewith. After battling against a stiff northwester it reached Boston from the fishing grounds almost completely covered with a frozen crust. The crew had to chop its way to the hatches to get at the cargo of fish.

TOMMY'S OLD BOOTS FOUND TO HAVE MANY USES

Few things in the past have been considered so utterly worthless as worn-out boots and shoes. War economy, however, has shown the British that few things have a greater number of practical uses than these very articles. Therefore millions of pounds of old footgear discarded by Tommy do not mold in dump heaps. Scrap sole leather, mixed with limestone or slag and bound with bitumen and asphalt, makes a resilient paving material that has the hardness and firmness of tar-treated macadam, it is reported. Animal charcoal, with ammonium sulphate as a valuable by-product, is produced from worn leather, glue is manufactured, grease extracted, cyanides and prussiates obtained, and such things as leather pulp, washers, leather board, and other commodities made. Altogether, a mountain of old shoes is by no means valueless.

MOTOR OPERATED WRENCH SAVES MECHANIC'S TIME

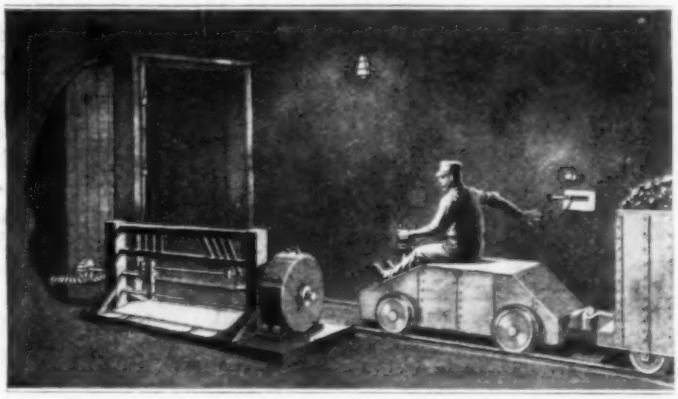
For factory and shop use an electrically driven portable socket wrench, particularly suited for motor-car work and similar purposes, has been developed. In shape it is cylindrical and of small diameter. The weight amounts to about 10 lb. The device is equipped with a high-speed motor, is reversible, and has a switch that permits proper acceleration. With a 64 to 1 double right-angle worm and gear drive, abundant power is provided. An automatic clutch, that may be adjusted so as to respond to any desired pressure, releases when a nut has been tightened to a predetermined tension. The instrument will accommodate a nut of any ordinary size as well as drills and screwdrivers. It is equipped with a universal-joint arrangement that facilitates its use in places difficult of access.



Nuts are Tightened or Removed in One-Tenth the Time the Same Work would Require if Done by Hand. When Desired, the Tool may be Used for Drilling

NEW MINE DOOR OPERATES ELECTRICALLY

An electrically operated mine door and safety signal has been tested recently, which is designed to save the heavy cost entailed in maintaining doorkeepers and also to prevent accidents on mine tracks. The door is operated by means of a small motor, having a bevel gear at the end of its driving shaft, meshing with a gear wheel on which the door swings. In each approach to the door, within reach of the operator of a mine car, is a switch and signal light. The throwing of the switch starts the motor, causing the closed door to swing open. By means of a shoe, traveling on the shaft of the motor, the current is automatically cut off when the door has been opened, and the polarity of the motor is reversed, so that the next time a switch is turned the motor will close the door. When the door is shut a red light shows beside the switch, while a green light shows when it is open, indicating a clear track.



An Electrically Operated Mine Door: When the Switch has been Thrown the Motor Opens the Door, Then is Cut Off and Reverses Itself Automatically. At the Same Time a Green Light Takes the Place of a Red One

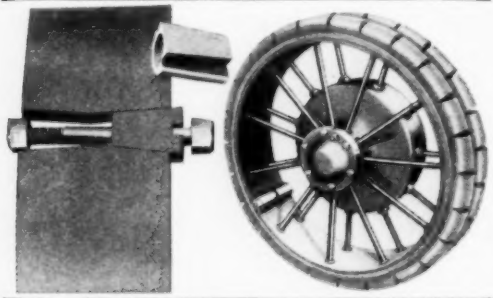
BRICK FOR BANK BUILDING SENT BY MAIL

Building and contracting by parcel post may be said to have become a reality, for there has recently been completed in Vernal, Utah, a substantial bank building made of brick, all of which, together with the hardware, were delivered by the government's mail service. There are no railroads in the vicinity of Vernal and all building material not of local production must be brought over stage roads. The contractors who undertook the erection of the bank estimated that it would be as cheap to forward the materials by the means stated as for them to haul it overland. Brick and the metal parts were sent from Salt Lake City in packages of the maximum weight permitted by the post office. It required several weeks to deliver the material for the building, which cost $22,000. The stone and lumber were obtained in the vicinity, and the glass was sent from Salt Lake City by wagon.

All the Brick and Hardware in This New Bank Building at Vernal, Utah, were Shipped to the Town by Mail

STEEL MOTOR-TRUCK WHEEL OFFERS MANY ADVANTAGES

Wheels for motor trucks constructed entirely of solid steel have given thoroughly satisfactory results in a series



Elimination of Warping Is One of the Principal Advantages of the All-Steel Truck Wheel

of tests to determine their practicability under the most adverse conditions. Spokes are shouldered and headed into both hub and rim. Pressed-on solid-rubber tires are used. The removal and application of tires is made easy by the adoption of a wedge mechanism, controlled by a bolt, which serves to expand or contract the outside diameter of the rim. A wrench and hammer are the only tools needed to make a tire change. Light weight, great strength, and economy of construction are claimed as paramount advantages of this type of wheel.

MILITARY MOTORCYCLISTS SHOW SKILL AND DARING

Charging up a 45° embankment at high speed, a Georgia soldier recently glided through the air for a distance of 35 ft., with the wheels of his machine 8 ft. off the ground. He landed without injury to himself or the motorcycle. Many members of the various American motorcycle corps now in training have displayed the most extraordinary skill and daring.

This Motorcycle Soldier Jumped a Distance of 35 Feet and Got His Wheels Eight Feet off the Ground

OYSTER BEDS ARE PLANNED FOR GREAT SALT LAKE

Plans have been made to begin the propagation of oysters in Bear River Bay, Salt Lake, Utah, this spring. Experiments and scientific study of local conditions have indicated, to the satisfaction of the state fish and game commissioner, that the enterprise is a thoroughly feasible one. Analysis has shown that the percentage of salt in the water is practically the same as in ocean oyster beds. In searching for a desirable section of the bay to commence operations, those in charge of the work used an amphibious craft

With the Mud Boat, Searching for Potential Oyster-Breeding Grounds in Bear River Bay

built particularly for navigating shallow waters and negotiating salt and mud bars. The boat, a long, narrow motor-driven scow, is provided with side wheels that propel it through the water and across mud. Except for it, exploration of certain parts of the bay would have been difficult.

BUREAU HELPED FIRMS IN GETTING WAR ORDERS

At this time, when the whole nation must share in the making of war supplies, the Northwest has shown itself particularly alert in keeping in touch with the government's needs. The

Seattle Chamber of Commerce, for example, has established what is called an industrial bureau that serves as a center where firms seeking to obtain orders from the government can secure the necessary data soon after they have been issued. In connection with this bureau a large bulletin board is maintained, labeled "Government Business." Here, in rectangles respectively designated for the army, navy, navy yards, Panama Canal, etc., are posted scores of the government's calls for bids.

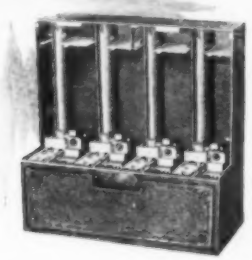
NEVADA DESERT DRY LAKE FINE SPEEDWAY

The dry bed of a former lake in the Nevada Desert is considered by motorists the finest, largest, and safest speedway in the world. It is 12 miles long, three miles wide, and its surface is as smooth, level, and hard as that of any table. Because of the isolated location the visiting motorist usually has the entire track to himself, so that the most reckless speed endangers only its indulger. Such dry lake beds are fairly numerous in the western portions of the United States and Mexico.

The Hard, Level Path Is Clear for a Distance of Twelve Miles, and the Only Speed Limit on This Natural Speedway Is in the Possibilities of One's Machine

SAVINGS SLOT MACHINES MAKE BANKING EASY

Thrift is being promoted among children and adults by installing a new machine in schools, lunch rooms, etc., which acts as an automatic receiving teller, enabling any who wish, to deposit small sums to their credit without going to a bank. Each machine is provided with slots for cents, nickels, dimes, and quarters. When a coin is placed in the proper slot and the plunger pressed, the apparatus discharges a stamp of the same denomination as the coin. After the depositor has accumulated a dollar's worth of stamps on a card that is provided, he may take them to the proper bank, and if he has no savings account, one will be opened for him and credit given for his stamps.

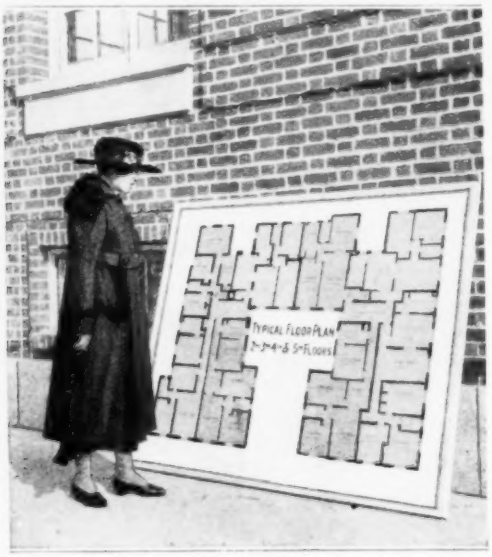


The Pupils Above are Depositing Savings in an Automatic Receiving Teller. The Right-Hand Views Show the Machine's Exterior and Interior

¶Recent tests made of a fireproof varnish for aeroplane wings are said to have been so successful that fireproof air craft may be an early possibility.

RENTING CITY APARTMENTS BY POSTING FLOOR PLANS

Chicago and New York apartment-building agents are realizing that in the last analysis the interior arrangement and convenient features of a high-grade flat, rather than the exterior architecture of the structure, cause people to sign leases. Gradually they are adopting the policy of making as conspicuous display of the floor plans as they do of rent signs. A large board giving a diagram of the apartments and indicating outstanding advantages quickly attracts flat hunters when properly placed adjacent to the sidewalk.



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Most City Pedestrians Are Potential Flat Hunters. By Advertising the Floor Plan of a Building in This Way, Attention is Drawn Quickly

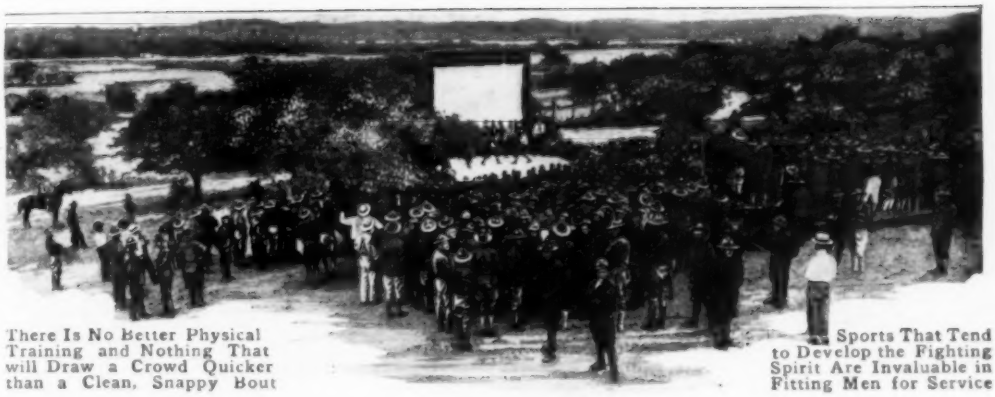
FLYING CREATES PROBLEMS FOR THE CHEMIST

The swift development of the science of aviation has produced a number of highly important questions which, in the opinion of experts, must be solved by the chemist. Ways must be found, for example, to overcome the susceptibility of machines to sudden changes of temperature, and some sort of a chemical compound is needed to make cloth, used in aeroplanes and elsewhere, waterproof, air-proof, and slow-burning. Other fields for the chemist are suggested by the demand for rustproof metal parts and light alloys.

BIG LOCOMOTIVE WRECKED BY RUNAWAY FLIGHT

When the crew of a huge mallet-type locomotive stepped from their cab at the summit of a mountain grade recently, the brakes of the engine in some unaccountable manner became loose and the locomotive backed away down the hill. On a grade of nearly four per cent it gained terrific momentum in a run of about a mile before being derailed on a curve and wrecked against a wall of rock adjoining a mine. An employe of the mine was crossing the track carrying a large pipe valve when he saw the derelict coming. He dropped his burden and jumped to safety. Transcontinental traffic was delayed by the accident.

After Careening Down Grade for a Mile, the Locomotive was Derailed on a Curve and Wrecked



There Is No Better Physical Training and Nothing That will Draw a Crowd Quicker than a Clean, Snappy Bout

Sports That Tend to Develop the Fighting Spirit Are Invaluable in Fitting Men for Service

TRAINING SOLDIERS TO PLAY

By STANLEY TODD

AT each of the 16 National Army cantonments established in the country, the War Department has introduced an elaborate program of camp activities for the entertainment and education of the 640,000 men in training. This new policy has unquestionably contributed to the high morale and splendid spirit of teamwork and patriotism that the new citizen soldiers are constantly displaying. Our drafted men are not compelled to take part in these activities. But the Commission on Training-Camp Activities, which has supervision of this important work for the War Department, has one purpose in mind. It is to interest the troops, during their free hours, in wholesome and militarily valuable pastimes.

The first of these is, of course, athletics, which tend to develop the men physically and to stimulate both initiative and team play. But to occupy the soldiers in the evenings has been a bigger problem. This, too, has been solved by the facilities which the Y. M. C. A. and the government have provided—clubhouses, meeting halls, theaters, and stores—to make the life of the men as nearly normal as possible. Here practically every one of the 40,000 men in the average cantonment can find interesting events, of which he can be a spectator, or, more particularly, a participant.

When the training camps were established, in the incredibly short space of three months, the necessity for recreations for the soldiers was promptly recognized. To save time and accomplish its object most effectively, the War Department commission

The "Triangle" Auditorium at Camp Devens, Ayer, Massachusetts, Where National Army Boys from Maine, New Hampshire, Vermont, Rhode Island, Connecticut, and Part of New York are Training for the Job in France

At the Desk in the "Y" Headquarters at Plattsburg, New York: Here the Innumerable Wants and Needs of Our Boys Receive Attention

made it a policy to accept, wherever possible, the services of existing organizations in carrying on its recreational work. Among the first of these to volunteer was the Y. M. C. A. The association had done splendid work along these lines at the Mexican border camps last year, and Mr. Raymond B. Fosdick, the chairman of the new commission, had studied the conditions in those camps at that time. So the association was allowed to go ahead with its war plans, with the result that when the first increment of drafted men of the various states arrived at the army cantonments last September, they found a Y. M. C. A. tent on the grounds, and it was most welcome as a place where they could pass their evenings.

The work of the Y. M. C. A. in the cantonments has since expanded in a remarkable degree. The tents have given way to wooden buildings—"huts" they are called—each of which is a combined clubhouse, moving-picture theater, and church. At Camp Dix, Wrightstown, N. J., for instance, there are eight of these green-painted huts—the only painted

The Exterior of a "Hut" may be Plain, but Is Always of Thousands of Plucky Fellows Here and in a Soldier's Life Comes

No College Man Forgets the After-Dinner Hours Spent at His Fraternity House, and No Soldier will Forget Similar Hours with His Comrades in Y. M. C. A. "Huts"

buildings in camp—located at various points in the immense grounds, so as to serve the largest possible number of troops. Here the men find a comfortable fireplace, an up-to-date library, facilities for writing letters, and various games. At night, these huts are thronged with men, particularly as there is "something going on" every evening in the hall—if not "movies," then perhaps "stunt night," boxing or wrestling matches,

or "amateur night" given by "home talent." Special educational classes, particularly lessons in French, are also frequently held.

The center of the Y. M. C. A. activities is the auditorium, conveniently located and accommodating 6,000 men. Throughout the cantonments, these meeting places are built on exactly the same model. At one end is a platform equipped with a moving-picture screen and a piano. Benches fill the center of the hall and at every possible place about the walls and on the supporting columns in the center are shelves for letter writing, the "materials" being furnished free of charge by the association. A small wing on one side is the "quiet room," a sort of clubhouse, made cozy by a huge fireplace, rocking chairs, and couches. In a passageway is an office counter, in charge of association secretaries. Here a soldier can procure stamps, string, wrapping paper, books, magazines, games, and a whole list of things that are kept available for his comfort, convenience, and amusement.

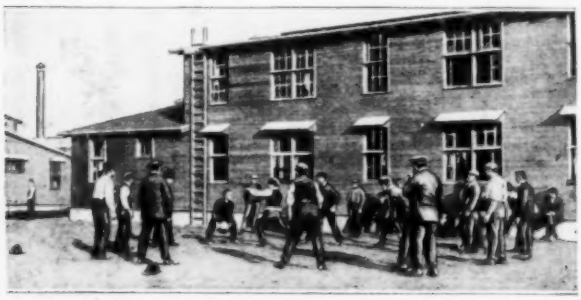
Do the Soldiers Need the Y. M. C. A.? Do They Use Its Facilities? Ask Any Mother Whose Son Is among This Group of Letter Writers

Attractive. The Interior of More than One of Them has Warmed the Hearts Overseas. Nothing can Fill the Place of Home, Yet Nothing Nearer Doing So than These Gathering Places

But even with these Y. M. C. A. auditoriums and huts, the cantonments are so extensive and have such a big population, that other meeting places are needed. The Knights of Columbus have constructed special buildings of a slightly different type, where rec-

Good Books and Lots of Them: The Camp Library Where Reference Works as Well as Thrill-to-a-Page Novels of the Better Sort Are Available for All Who Care to Make Use of Them

reational programs are also carried out, while the Jewish Welfare League has under way plans for carrying on similar work in behalf of the men of that faith. The government has also taken a hand and has authorized the construction in each National Army cantonment of a great theater, with all of the equipment of a modern stage. In several of the camps, the construction of these "Liberty Theaters," as they are to be known, has already been started. Nor will there be any lack of suitable productions, for the theatrical interests as their "bit" have agreed to bring metropolitan successes and famous stars to the camps, so that the boys can see them. Democracy will be the rule for no seats will be reserved, so that it will be "first come, first served." The maximum capacity of the theaters will perhaps be 10,000.



The Medicine Ball Affords Fine Exercise for Men Untrained in Any Sport and Any Number Can Engage in the Game

The drafted men are encouraged to give entertainments among themselves, the huts being available for this purpose. Even this has a military value, in that it gives the men self-confidence and tends to make each company independent of its environment. To stimulate this activity, each company elects four different committees among its men, namely, an athletic council, an entertainment committee, an educational section, and a religious class. Thus, the organized effort to foster wholesome camp activities begins right in the company barracks.

The military authorities have been prompt to recognize the high military value of mass singing in keeping up the morale of an army even under adverse conditions. In the National Army cantonments this has received expert attention. Not only is singing taught and encouraged at the Y. M. C. A. huts, but the Commission on Training-Camp Activities has gone a long way to stimulate it among the regiments. Well-known song leaders volunteered and were assigned to different camps, where choruses of 4,000 voices are frequently heard, sometimes out in the open. There is hardly a meeting at which the men do not sing, and "The Star-Spangled Banner" is stimulating patriotism and making Uncle Sam's drafted army a singing army.

If none of these evening entertainments should appeal to a man, he still

Any Wholesome Sport That Develops and Trains the Muscles and Quickens the Mental Faculties, in Addition to Giving Recreation, Is Valuable for Soldiers in the Building. Among Such Games Is Basketball

The Y. M. C. A. Auditorium Provides Rooms for Frequent Entertainments, Movie Exhibitions, and Camp Gatherings. The Popularity of These Evening Diversions is Fairly Well Indicated by the Attendance Shown Here

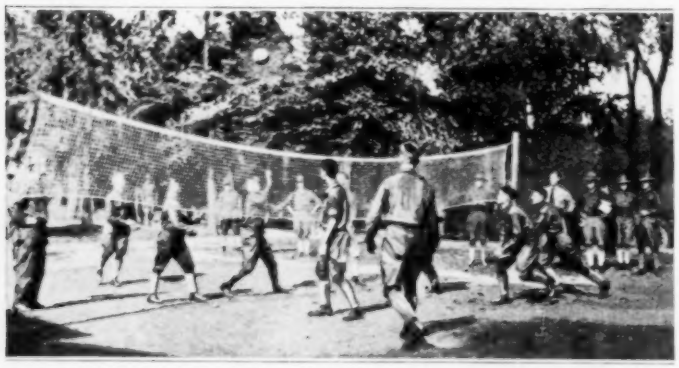
has recourse to books, not only in the Y. M. C. A., but in the public library which every camp now possesses, or will eventually have. A recent campaign initiated by the American Library Association, to whom the commission turned over the task of organizing camp libraries, resulted in a million-dollar fund for the purchase of books. Thousands of volumes and magazines have been donated, while the War Department has set aside a special building for a circulating library. An experienced librarian is in charge in each camp, and a good book is in the reach of every soldier. Or the man in camp can spend some of his leisure time—and his money, too—at the regimental post exchange, or "canteen," which the government runs for the benefit of the troops, the profits being turned over to the regimental commanders, to be devoted to any purposes that the men prefer.

Camp Athletics as a Military-Training Factor

In taking up camp activities the commission gave first attention to athletics. The objects were threefold: first, to occupy the spare time of soldiers in a profitable way; second, to develop them physically, and third, to inculcate the spirit of team play and discipline, which is indispensable in trench fighting. The government has given its hearty support to the athletic propaganda and when the troops are free from drills and the daily routine, particularly Wednesday and Saturday afternoons, they are generally employed in some athletic pastime.

When the cantonments were built, big open spaces were set aside as athletic fields. At Camp Lewis, American Lake, Wash., for instance, the field occupies the center of the grounds and the hundreds of barracks are located around them. Here there is a running track, as well as some 25 football fields, and plenty of room for basketball, volley ball, and other games. Recently a track meet was held at Camp Lewis, where besides the field events there were obstacle and hurdle races, a tug of war, boxing and wrestling, while the day ended with

"everybody joining in the chorus." At Camp Meade, Annapolis Junction, Md., the athletic field was in constant use in



Every One Knows What Volley Ball Does for Its Players, and at Most of the Army Cantonments the Soldiers Have Chances to Indulge in the Game

the fall for football, games being played between different regiments and, in certain cases, between picked teams of different cantonments.

The men have additional opportunity to indulge in outdoor games among themselves. The government made an appropriation of about 75 cents a soldier for athletic equipment, which while it does not fully meet the demand, has been sufficient to provide baseballs, bats, basketballs, soccer balls, and boxing gloves for the different companies. Even quoits with discarded horseshoes find favor with some of the men who cannot get athletic equipment because some one else is using it. Frequently the profits which a company may receive from the regimental post exchange are devoted to the purchase of additional athletic equipment.

So important are athletics at the training camps, that the commission assigned one of its members, Dr. Joseph E. Raycroft, of Princeton University, to direct these activities in all the camps. His purpose has been to encourage the largest possible number of soldiers to participate regularly in some form of athletics during their leisure time. Special stress has been laid upon hard competitive sports that develop the fighting instinct. In its work in the camps, the Y. M. C. A. anticipated this need and its athletic program is highly developed. A number of physical instructors and secretaries are doing their utmost to encourage athletics.

An interesting example of the high point to which athletics in the National Army camps has been developed was given at the Polo Grounds in New York City, in November. Young men, who a scant two months before had left counters, factories, and offices to become soldiers, were wildly enthusiastic spectators at a football game between the men of Camp Upton and Camp Devens. The Upton team was managed by Capt. Frank Glick of the 1915 Princeton eleven, now division athletic officer at the Yaphank cantonment, while the victorious Camp Devens boys were led by Capt. Percy Haughton, another old football star, in charge of athletics at the camp at Ayer, Mass. Incidentally, the National Army men in an exhibition drilled and marched like veterans—and with splendid spirit.

Among the athletic recreations, particular stress has been placed upon boxing, because of its great value as a preliminary to bayonet practice. The aid of famous pugilists has been enlisted by the War Department and 15 of them are acting as boxing instructors at the cantonments. They are training specially detailed groups of men, who have had previous knowledge of the sport, and the latter are teaching men in the different camps. Moving pictures were enacted recently to demonstrate the fundamental principles of boxing and the elements of bayonet practice. These films are being shown in the Y. M. C. A. picture houses throughout the camps, along with other "movies" of an educational nature.

All of these recreations are maintained for the benefit of the boys while

in camp. But there is another important phase of the work of the Commission on Training-Camp Activities—taking care of the men while out of the camp on furlough. Camp Sherman at Chillicothe, Ohio, has 40,000 men, while the population of the city is only half that number. The city is only two and one-half miles away. This big problem has been taken hold of by the Parks and Playground Recreation Association, under the title of "War Camp Community Service," acting for the commission. Its purpose is to enlist the coöperation of communities adjacent to the camps throughout the country, in furnishing wholesome recreations for the soldiers when they come to town. The splendid response the people have made to the recent campaign in behalf of the War Camp Community Service fund has resulted in a number of clubhouses, hotels, and theaters being erected in cities and towns adjacent to the camps, for the purpose of entertaining the soldiers.

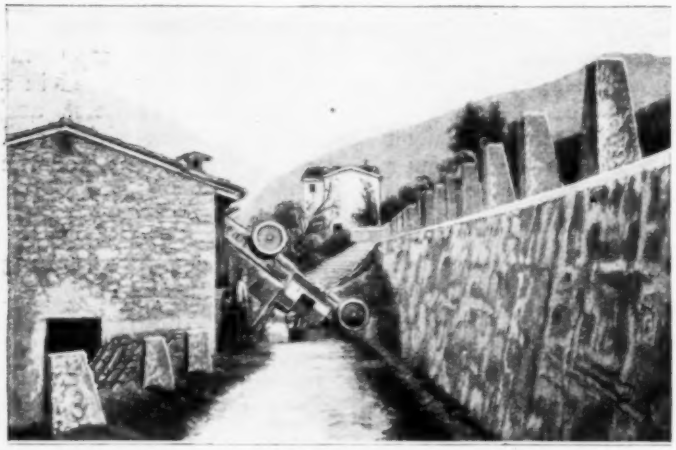
FIRST SECTION OF BILLION-GALLON DAM FINISHED

To increase the water supply of Salt Lake City, a multiple-arch, reinforced-concrete dam has been constructed in Parley's Cañon, about 10 miles away. In its present stage of completion, the structure represents an investment of about $95,000. It is 105 ft. high, 132 ft. in width at the base, and 365 ft. long across the top. It now permits the storage of about 300,000,000 gal. of water. The erection of the second unit, which will give the structure an additional height of 40 ft., will increase the reservoir capacity to 1,000,000,000 gal. It is known as the Mount Dell dam.

Mount Dell Dam in Parley's Cañon: Part of a Utah Development Project That will Increase Salt Lake City's Water Supply

WAR CAR ON SPREE DASHES ACROSS ROOF OF HOUSE

While racing down a road in a rough sector of the Trentino, some time ago, a military motor car got beyond control at a point where the highway swerves around a small stone house. Instead of taking the curve, it leaped onto the peaked roof, climbed over the cornice, shot down the opposite slope, plunged across an open area, and for a moment balanced itself on the road's retaining wall on the other side of the horseshoe curve. Then it slipped, turned turtle, and fell back against the dwelling over which it had passed.



The Road Curves around the Little House. Instead of Keeping on It, the Motor Car Leaped over the Roof of the Dwelling and Almost Negotiated the Retaining Wall at the Right

HOW LARGE HEAPS OF COAL MAY BE VENTILATED

The proper way to guard against spontaneous combustion in large piles of coal, according to the British Fire Prevention Committee, is to insert vertically in the fuel heaps, at the time they are built, iron or earthenware pipes, 3 to 4 in. in diameter. One ventilator should be provided for every 300 sq. ft., and the lower ends of these pipes should be at various depths. About 10 ft. is given as the permissible maximum height for the piles. Occasionally a thermometer ought to be lowered into the pipes to ascertain the temperature of the covered coal. An American company has varied the above plan by using discarded boiler pipes, inserting them horizontally.

ODD CONSTRUCTION CAUSED BY RAILROAD LITIGATION

To get its tracks laid before a suburb opposed to its coming could incorporate and refuse a franchise, a railroad built a branch line to the very walls of the buildings along the right of way. Haste was essential even though labor was scarce. The wrecking of the houses was therefore delayed until some of the actual grade construction had been accomplished.

The new branch line will open for development a tract of rich territory which has heretofore lain dormant for lack of satisfactory transportation facilities.

Before Work could be Legally Stopped the Tracks were Laid to the Walls of the Houses

An Artistic Bridge Serving in a Double Capacity: In Addition to Being a Carrier of Traffic, the Central Portion of This Structure Houses a Pumping Plant

BRIDGE AND POWER PLANT FORM ONE STRUCTURE

Spanning a canal, which forms part of the Chicago drainage system and starts from Lake Michigan a few miles north of the city, is a handsome reinforced-concrete bridge that serves a double purpose. In addition to carrying traffic over the canal and an adjoining thoroughfare, a power house has been incorporated in the structure, directly above the artificial water channel. Many-paned arched windows and ornamental railings and electric lights combine to make the improvement very pleasing in appearance. The power plant located under the bridge is employed to elevate water from the lake into the canal.

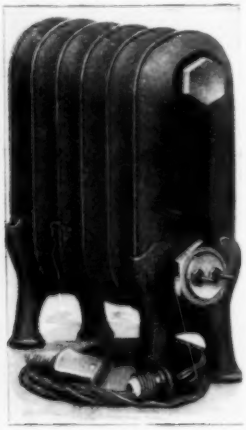
BRICK UNLOADED BY TRUCK WITHOUT BREAKAGE

For handling finished brick economically and without breakage, a truck with an ingenious unloading body has been constructed. Instead of being dumped, the load is deposited in an orderly pile when the steel container is turned to a perpendicular position so that one end rests on the ground. The tail gate is a wood panel held in place by a long pin. When released by the removal of the latter, it serves as a platform for the stack of bricks. The open-end body is then pulled away and the load left standing. The whole operation is performed in a moment's time and obviously effects a great saving in labor.

Two Views of the Unloading Truck in Use: At the Left the Steel Body has been Placed on End so that When It is Withdrawn, as Pictured at the Right, the Bricks are Left in an Orderly Upright Column

NEW ELECTRIC RADIATOR FILLED WITH GAS

A distinctive feature of a new portable electric radiator, which can be connected with any light socket, is that it is hermetically sealed and filled with nitrogen gas. In this respect it resembles the type of electric-light bulb which is filled with nitrogen gas to prevent the rapid deterioration of the filament by oxidation.



FIRST AID TAUGHT WIVES OF MINERS

Eight mine-rescue cars, each with a crew of men trained in modern rescue methods, have been making the rounds of mining communities, instructing several hundred women in first-aid work and how to prevent disasters under ground. The casualties in American mines have been large, in the past, and fatalities have been approximately 3.3 for every thousand men employed. But since these first-aid courses were instituted it is said that the time lost in mining because of accidents has been materially reduced. Incidentally, there has been better school attendance on the part of miners' children.

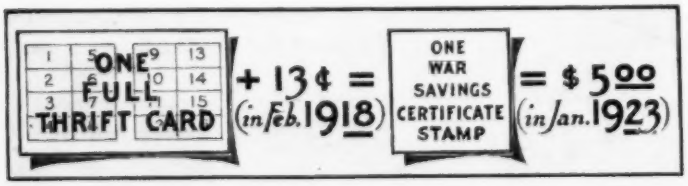
SOLDIERS' PRAYER BOOK IN IDENTIFICATION TAG

A book of prayers is contained, together with a tiny crucifix, in an identification tag being supplied to Catholic soldiers and sailors. The prayer book also contains services for non-Catholics.

¶ A concern making electrical specialties has recently placed on the market a toggle switch for automobiles, so designed that pointing the lever upward turns on the current, and pointing it downward shuts it off.

SAVING STAMPS ENABLE ALL TO HELP WIN WAR

Our government has instituted the greatest money-saving campaign in our history by offering for sale thrift stamps and war-savings certificate stamps at such prices that any person, able to lay aside 25 cents at a time, can secure four per cent compound interest on his money from the government. Thrift cards, with places for 16 thrift stamps each, can be obtained free from any post office or other authorized agent. The plan is for each card holder to buy stamps as he is able, at 25 cents each. When a card has been filled it can be exchanged for a war-savings certificate stamp by paying a few cents additional. This stamp, while it will have cost the buyer a few cents more than $4, will be worth $5 on Jan. 1, 1923. War-savings certificates are provided which hold 20 certificate stamps. These $5 stamps may be redeemed before the date of maturity, if desired, but not at so favorable a price.



The Relative Value of 16 Thrift Stamps and One War-Savings Certificate Stamp: Money Invested in This Way will Yield Four Per Cent Compound Interest

New Sources of Leather Supply

by Phil Norton

Camouflage in the North: A Scheme Employed by Members of an Arctic Expedition, Recently Returned, for Getting within Close Range of Fine Specimens Wanted for the American Museum of Natural History

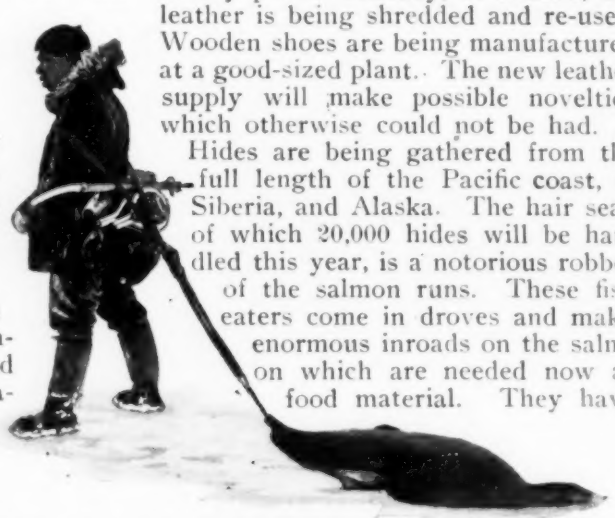
ECONOMIC gains are being constantly made under the spur of war needs. These gains come from the discovery of new sources for procuring necessary supplies. Despised weeds are now yielding sorely needed drugs. Soya beans, imported by the ship load for their oil value, have, under government investigation, been found to replace satisfactorily meat, milk, flour, and eggs. Most important, perhaps, is the increased use of marine hides for leather.

Animals long considered pests to be killed are now hunted as a profitable occupation. Aquatic animals which have been sought only for their oils now yield an additional profit by giving up their hides for leather. The walrus, sea lion, hair seal, shark, whale, reindeer, caribou, Chinese goat, and others, provide material for shoe tops and novelties. A Seattle man who had sold $750,000 worth of leather which he could not deliver resorted to the use of these leathers, located a market for them, and developed the supply. Through experiments conducted at his expense he discovered new uses for the leathers and proved his plan to be feasible. A recent shipment of two carloads of assorted leather hides from more or less unknown sources is the result. According to a report made to the Foreign Trade Bureau of the Seattle Chamber of Commerce by a leather expert, this shipment includes thousands of skins from little-known

There Was a Time When the Walrus was Killed Chiefly for His Tusks. Today, However, the Hide Commands a High Price and the Oil Is in Demand. The Picture Shows a Group of Natives with Trophies of Their Hunt

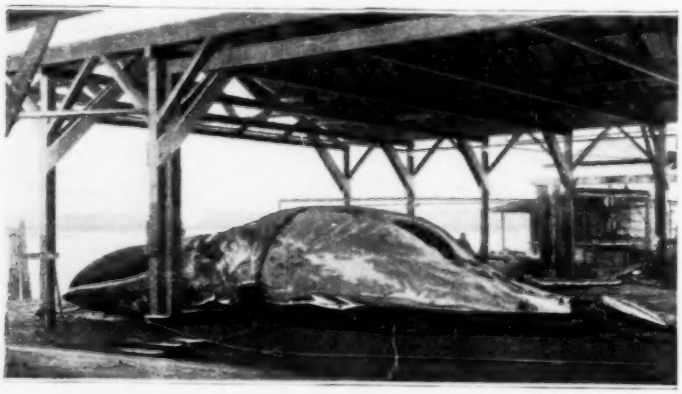
leather-producing animals of the Northwest.

The field for collecting hides has increased until Japan, China, and Siberia are sending supplies in order that the women of America may have fancy-leather shoe tops. From Japan comes the walrus hide. China sends goat skins. The industry has developed considerably this season. There are still hundreds of lonely trappers and fishermen who will add materially to their profits when word reaches them that the heretofore despised hair seal yields a marketable skin. High prices of leather made possible the introduction of these unusual hides, but the business is expected to go on when normal conditions have returned. At present the profit for both the hunter and trader in individual deals must be large to enable the experiment to be remunerative. The deals, being very small, require a large margin. When the industry is firmly established the volume will be large and profit percentage may be reduced. These sources of leather are not expected to reduce high prices during the war. They will only aid in keeping leather on American feet at any price. Already, at Seattle, old leather is being shredded and re-used. Wooden shoes are being manufactured at a good-sized plant. The new leather supply will make possible novelties which otherwise could not be had.



Bringing in a Hair Seal, the Hide of Which Provides a Durable Leather That Is Suitable for a Variety of Purposes

Hides are being gathered from the full length of the Pacific coast, in Siberia, and Alaska. The hair seal, of which 20,000 hides will be handled this year, is a notorious robber of the salmon runs. These fish eaters come in droves and make enormous inroads on the salmon which are needed now as food material. They have been destroyed by the thousands. In the past, sandbars, which are above water at low tide, have been heavily mined with dynamite. When the hair seals covered the bars in masses the mines were exploded. This destruction will no longer be necessary because the fishermen along the Canadian coast and as far south as the northern California border will hereafter hunt the hair seal for its hide. They are now robbers with a price on their heads and it will not be long before their numbers will be largely reduced. Fishermen have stated that they can make good money in handling hair seals at 50 cents a hide, because the work consists entirely of skinning. They are so plentiful that the finding and killing is of small consequence. The buyers are paying more than 50 cents for these hides at this time. The hair-seal skin is used for upper leather on shoes, pocketbooks, and ladies' handbags.



Whale Skin When Properly Tanned Supplies Leather for Shoes and Gloves. It Has the Advantage of Being Less Porous than Many Leathers and Therefore Water Resisting

A branch of the hair seal, the "oogo-

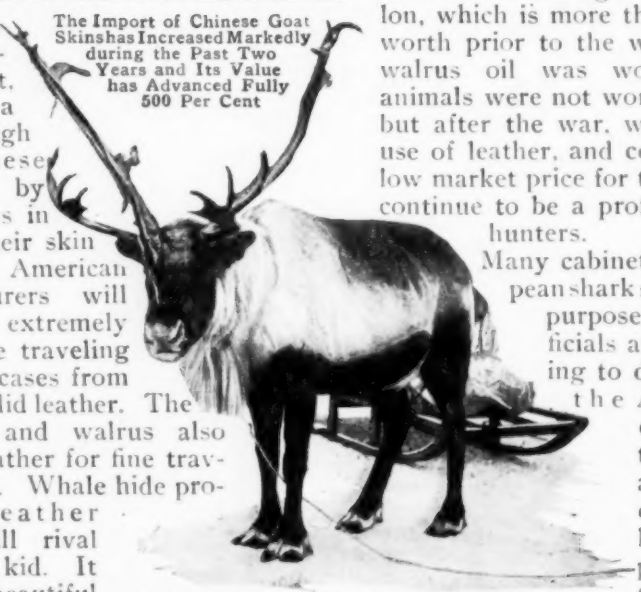
Hunters and Their Sleeping Prey: The Increased Demand for the Hides is Making Walrus Shooting a Busy Occupation

Natives have Used Walrus Hides as Roofing for Their Huts, but the Practice is Passing, Owing to the Present Status of the Leather Market

High-Power Rifles and Long Knives Are the Weapons of the Walrus Hunters. Three Carcasses are Shown on the Ice

The Import of Chinese Goat Skins has Increased Markedly during the Past Two Years and Its Value has Advanced Fully 500 Per Cent

rook," as the Esquimos call it, yields a large, tough hide. These are used by the natives in making their skin boats. American manufacturers will make extremely serviceable traveling bags and cases from this splendid leather. The sea lion and walrus also furnish leather for fine traveling bags. Whale hide produces leather which will rival the finest kid. It is of beautiful grain and is soft like velvet.



The Reindeer Population of Alaska Amounts to More than 100,000 Now, and in 20 Years, It has been Estimated, It will Pass the Million Mark

There are 102,000 head of reindeer in Alaska, and government estimates place the reindeer population at more than a million within 20 years. The young deer afford fur, and the skins of the older animals make good, durable leathers.

Prices of leather will not be lowered through the introduction of these materials, for the demand is far greater than the supply. Many of the animals now being skinned were previously considered chiefly for other products. The whale was hunted for its oil, the walrus for its tusks. Today, walrus oil sells for as high as 75 cents a gallon, which is more than whale oil was worth prior to the war. In the past, walrus oil was worth little. The animals were not worthy of the chase; but after the war, with the increased use of leather, and considering even a low market price for the oils, there will continue to be a profit for the walrus hunters.

Many cabinetmakers use European shark skins for polishing purposes. Government officials are now investigating to determine whether the American shark cannot command this field. The Seattle concern handling these hides has established purchasing stations in Vladivostok, Japan, China, Alaska, and along the Pacific coast. Shipments were already quite large when the government took official note of the work and indorsed the movement.

According to a Washington dispatch,

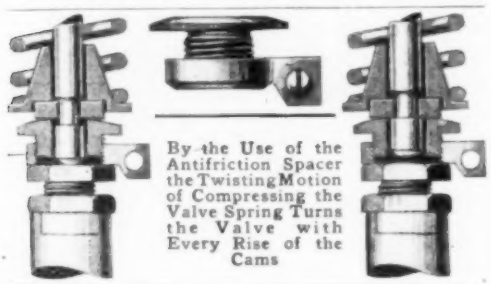
Reindeer Leather Is by No Means Unknown to Americans, Yet in Years to Come Our Familiarity with It will Doubtless Increase Materially. Here Several Thousand of the Animals are Seen on the Snow of the North

whale meat as a chafing-dish morsel, and shark and porpoise skins as leather luxuries, are growing in favor with the consuming public. This information is authenticated by the fisheries service, which states that the appetite for whale meat is gaining ground and 247,000 lb. of it were marketed by one Pacific northwestern concern to the people of Seattle and San Francisco last year. A company has been organized and has asked permission to hunt whales in the waters off southern California in order to supply the demand. The government is encouraging the use of whale meat for food.

The fisheries service announces that it is also furnishing skins of sharks and other aquatic animals to experimenters. More than 40 tanners already are utilizing them. Fishermen are being urged to furnish tanners with these supplies of raw materials. A new economic gain is being established.

ROTATING POPPET VALVES TO ELIMINATE GRINDING

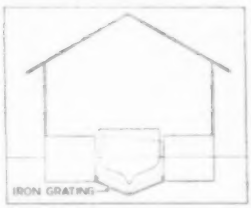
The necessity of frequent valve grinding in internal-combustion motors of the poppet-valve type is eliminated by a mechanism which prevents pitting, warping, and deposits, by constant rotating of the valve. This is accomplished by the use of an antifriction spacer which permits the valve to turn freely in its fastenings. Thus the twisting motion developed by the compression of the coil springs causes the valve to rotate and polish itself.



By the Use of the Antifriction Spacer the Twisting Motion of Compressing the Valve Spring Turns the Valve with Every Rise of the Cams

MOTORBOATS CANNOT SINK IN FLOATING BOATHOUSE

Costly motorboats housed in floating boathouses are safeguarded against sinking while in dock by means of a grating of steel bars fastened under the structure and between the pontoons sustaining it. The grating covers the entire bottom of the slip, but is hung low enough to insure a clearance of several inches under the keel of the loaded boat. With this protection installed, lack of attention to the bilge pump or a leaky stuffing box can depress the boat but a few inches, before the keel rests on the grating and it can sink no farther.



Floating Boathouses Which Prevent Sinking of Boats While in Dock

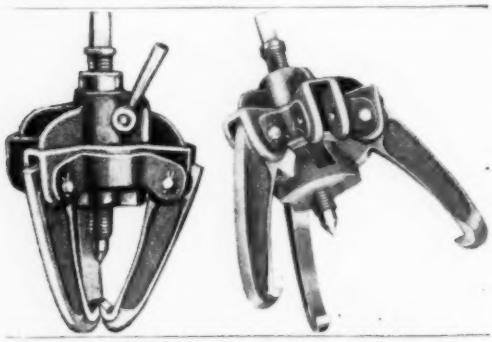
CHURCH ALL THAT REMAINS OF MASSACHUSETTS TOWN

All that remains of West Boylston, Mass., since the construction of the Wachusett reservoir, is a small stone church. The edifice is now more picturesque than ever, for it stands entirely alone on a tiny peninsula extending into the water below a wooded hill. For sentimental reasons, partly, it was saved when the rest of the town was razed for the water project.

All That Remains of a Town of 3,000 Inhabitants: A Little Stone Church Picturesquely Situated

AUTOMATIC GEAR PULLER HAS POSITIVE GRIP

A new gear puller is provided with a mechanism by which its jaws are automatically adjusted to various sizes



Left: The Grip Puller with the Central Screw Adjusted for Pulling. Right: The Tool Ready for Application

of pulleys or gears that are to be removed from a shaft. The arrangement is such that pressure applied to the central screw forces all the jaws inward toward the axle or shaft. Once closed on an object the jaws cannot slip off.

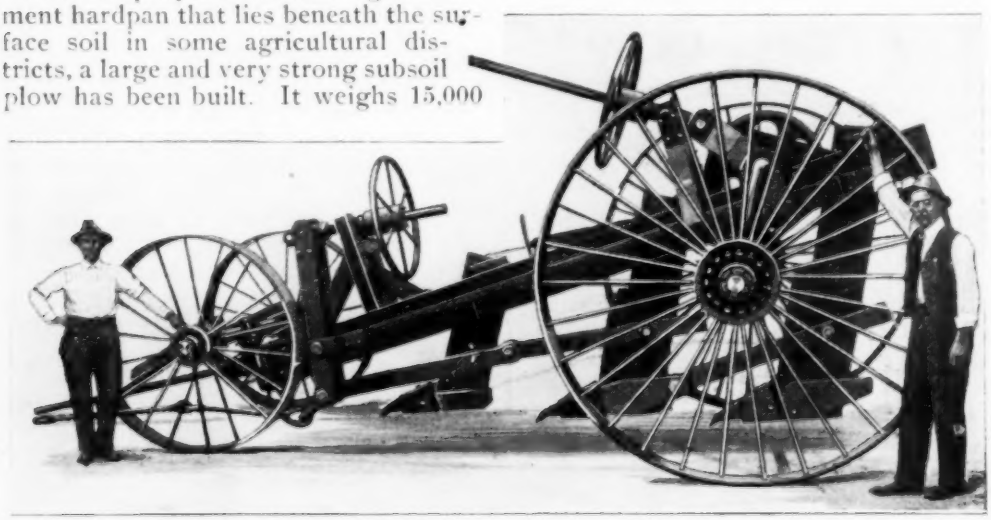
BIG SUBSOIL PLOW IS USED FOR EXTRA-HEAVY DUTY

For the purpose of breaking the cement hardpan that lies beneath the surface soil in some agricultural districts, a large and very strong subsoil plow has been built. It weighs 15,000 lb., is 24 ft. long, and mounted at one end on wheels that are 8 ft. in diameter.

The blades are attached to standards arranged in line, the first one extending 16 in., the second, 32 in., and the third, 48 in. into the ground when in use. Tractors developing a total of about 300 hp. are required for handling the implement.

SEATTLE PROUD TO LAUNCH FIRST EMERGENCY SHIP

Just 78 days after its keel was laid, the first vessel of the fleet being built under direct contract placed by the government's emergency fleet corporation was launched at Seattle, Wash., amid scenes of extraordinary enthusiasm. The reason for the exceptional demonstration was that the people of the city had set out, as a matter of local pride, to construct this first vessel with the utmost speed. Men of many trades and professions gave up their regular employment for the purpose of helping as laborers and artisans in this patriotic enterprise. The boat is a steel cargo carrier of 8,000 tons deadweight capacity and was christened the "Seattle." It is 423 ft. 9 in. long and 54 ft. wide. Two geared turbine engines of 2,500 hp. will supply the power.



Breaking the Ground to a Depth of 48 Inches, This Big Plow is Pulled by a String of Tractors Developing about 300 Horsepower

COMMENT AND REVIEW

TRAVELERS in Italy have marveled at the roads built 2,000 years ago by Julius Caesar; France has hundreds of miles of national roadways built by Napoleon which today are military roads of priceless value. In our own country there remain links here and there of government roads, stage-coach lines, constructed before the advent of the steam railway. Some progress has been made in spots in the worthy effort under the Lincoln and Dixie Highway plans. As for any extensive, comprehensive, adequate system of national roads, we have none.

Need of National Highways

Our railway system has been so progressive in construction, efficient in service, and prompt and dependable in operation during the past forty years, we have failed to anticipate a day when such roads as Caesar and Napoleon built and used would become a necessity here. Even the traffic on our inland waterways, where in the '60s hundreds of boats plied the Ohio, Mississippi, and Missouri rivers, has shrunk to a few towboats and barges.

Detroit and Toledo are centers of vast automobile production. The congestion of freight cars, loaded with both incoming and outgoing cargoes at these points, has been stupendous. The marvel is the railroads have been able to furnish so good a service under chaotic conditions. This congestion has steadily increased and is still growing. When, then, the government placed orders for thousands of motor vehicles for army use abroad, there was but one way in which to get them to the Atlantic seaboard quickly, and that was to drive them there on their own wheels. The picture of 10,000 motor trucks hastening eastward presents an inspiring sight. The trip is made in a week or less. The state roads across New York and Massachusetts are excellent, and we now begin to realize what a tremendous factor, at this time, equally good roads from Buffalo to Detroit and Chicago would mean. With such roads and huge motor trucks moving night and day, the trip from New York to Chicago might be made in four days, which is fast freight time under peace conditions. Even if seven days and nights were consumed in the trip, the service would still be possible in competition with express matter.

It will doubtless be undesirable to undertake the construction of such roads during the present shortage of labor, unless it could be done by convicts; but a far-reaching system of government highways should be one of the important considerations after the close of the war.

IN the early days of this country the grist mill was built where there was water power, and in time other industries also located there for the same reason. Many of our largest manufacturing cities have grown up around these grist mills. But many of the best water powers were so inaccessible, and the surrounding country so unfit for agriculture, that no mills and towns have ever taken advantage of the cheapest mill power known.

Harness Our Water Power

Today, thanks to the electric motor, transmission lines, and high voltage, the factory may locate convenient to transportation and labor, and have the water power brought to it.

Every twenty-four hours there goes to waste unused water power equivalent to the coal energy of 1,000,000 tons, or 365,000,000 tons each year. At a low average of present prices this waste represents $2,000,000,000 yearly.

Switzerland gets her coal from Germany. This year the supply is only two-thirds of requirements, yet Switzerland will pay Germany over $4,000,000 for coal. At the present moment there are undeveloped water powers in Switzerland amounting to 3,500,000 horsepower which, with the 526,000 horsepower already harnessed, would make Switzerland almost independent of outside coal supply.

Our own unused water powers remain undeveloped because the restrictions our Government demands do not appeal to private enterprise, which naturally is reluctant to invest vast sums under a franchise which may be terminated at any time. With the financial burdens with which our Government will emerge from this war, it will doubtless be years before Congress would feel justified in appropriating the money necessary to make this development. It would seem wise,

therefore, rather than wait an indefinite number of years, that a franchise of say fifty years should be granted, with privilege of taking over the properties at the end of that time on some basis of valuation, fair to Government and owners. On such a basis development would begin at once.

In the meantime the 1,000,000 tons' value of coal is rushing to the sea every twenty-four hours, an absolute waste, without the slightest benefit to anyone.

Russian Socialists Experiment

THERE are apparently as many kinds of socialists in Russia as there are varieties of grapes in a vineyard. These range all the way from nihilists and bomb throwers to quite conservative thinkers. At any rate, the word socialist in Russia and here, for instance, means quite different things in many respects. It might almost be said that any man or party in Russia who is anti-czar, calls itself socialist.

It is unfortunate in more ways than one that Germany has so speedily dominated Russia—or apparently so—for it would have been interesting to have watched how some fond theories, long cherished, worked out when the opportunity came to give them the acid test of actual use.

For instance, how far an army would get under direction of committees of privates; for one of the first acts of the bolsheviki was to form a committee of three from the ranks in each company, which was to decide what their company would do, and instruct the officers to carry out such decision. Even Kerensky and his cabinet associate, Savinkov, who soon after the revolution abolished the death penalty in both military and civil life, recently acknowledged to a distinguished American that to their great regret the ideal they had cherished proved to be impossible in these days, and after some weeks were obliged to return to the old way. And the same was true, they stated, in regard to other ideals; all right in theory, but in practice a failure.

At date of this writing, and from our distance, it would appear that Russia was lost to democracy and that by German intrigue she had merely exchanged a czar for a kaiser. Eighty-five per cent of the Russians are illiterate, and in their new-found freedom many of these have as wild expectations as the southern negroes when as suddenly set free. On the other hand, the very fact of many political parties of socialists gives expectation that Russia will not permanently be sacrificed to the ignorance and gullibility of the bolsheviki, whose present leader is a German who has changed his name to a Russian one.

That distinguished physician, Dr. Frank Billings, of Chicago, with the rank of lieutenant colonel, recently went to Russia at the head of the Red Cross Mission. With unusual courtesies at his command he traveled Russia and Siberia extensively, talking with representative men everywhere. The cabinet in control at this writing is the seventh, but Dr. Billings points out that each succeeding cabinet, by evolution, brings the national condition to a higher level than before. His observation as to the intelligence, ability and conduct of the masses there, is of a most encouraging nature, and places the Russian citizen, as a whole, on a very much higher plane than we have been accustomed to regard him. They are keen business men, surprisingly skillful in all manner of handicraft, thrifty, good-natured, and with freedom and education have the making of a nation of world leaders. If, therefore, German intrigue finally fails there as German arms already have, we may yet count Russia among the republics, and in the meantime we must be patient and can be hopeful that right and justice will, in good season, rule a free Russia.

Cut Out Red Tape

A SOMEWHAT discouraged, though not defeated, tone marks the words of our great captains of industry—men of large affairs—who have been called to Washington to help in this great crisis—men who have cheerfully left positions paying yearly salaries that most people would deem a fortune, to work for $1 a year.

These men accustomed to acting instantly in emergencies; men not afraid to accept responsibility; who think in terms of quick results; whose ability in the business world has long been acknowledged—what do these men find?

Red tape.

It ties him down to desk chairs when a business man would go to the other's office and save a week's time; it snarls about his feet when he

moves along the hall; it entangles him at every corner; it waves, and zigzags, and throbs; ties knots and fills the air with figures 8; glows in his dreams like a prairie fire and has the grip of an octopus. This is official red tape, about 30 per cent the result of necessary bookkeeping and 70 per cent accumulations of seventy-five years' effort to make jobs for political workers.

And now that the giant would stretch his arm and smite he finds—after being at war eight months—he is short of rifles and guns and cannon; that it is necessary to take 30,000 uniforms off the soldiers in one camp to send somewhere else, at a time when 30,000 tailors in New York City alone are out of work and with their families in desperate straits.

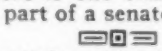
The business man accustomed to decision and action and immediate results finds his experience with red tape simply maddening. With all the efficiency men available, it would seem as though what we needed was some Napoleon to cut the hawser of red tape and let in a transport of old-fashioned "horse sense."

The foregoing is not uttered in a spirit of criticism, because the condition long antedates those who now suffer from it; but rather with the hope that in our present emergency all unnecessary curves may be taken out and short cuts substituted. Far better sacrifice official etiquette and time-honored traditions than cause delay of a single day in the delivery to a soldier of his uniform or rifle.

Since the above was written, the navy has been found to have gone ahead and done things, with the most happy result that, while increasing its forces about 400 per cent on very short notice, there appears to be the necessary naval uniforms and garments for every man, and sufficient guns and ammunition. Other departments can likewise find a way—if they exhibit the same will—to accomplish prompt results, for which the navy has plainly blazed the way; by a realization that we are at war, and getting results by cutting out a lot of red tape.

THE Senate committee, to whom was delegated the investigation of La Follette, made a faint bluff of doing something at the start, and then appeared to follow the course of the proverbial New Year's resolution. If they made a conscientious effort to get at the truth, the public somehow haven't been overwhelmed with the fact, and if they found out anything, it has, at this writing, been politely hushed up. And right here is where our law-making and governing bodies make a great mistake. To varnish, whitewash, camouflage, excuse, condone, conceal, or let go by default such official shortcomings as the senator is accused of, is radically wrong and the public simply will not stand for it forever. What does "senatorial courtesy" mean to the average voter? The man with the open life and the clean record has no occasion to avail himself of the "traditions" when accused, unjustly, of sedition. Instead of seeking delay and the oblivion which time throws over congressional investigations, one would naturally expect a demand for instant and complete investigation. Did you ever know an honest, innocent man, who, when accused of wrongdoing, did not insist on immediate and fullest investigation? La Follette by virtue of his office, was able to use the Government presses at a time when the Government Printing Office is weeks behind; and, we understand, mailed one million "public documents" under his frank, the postage on which would have cost you or me $30,000. But in all the million we do not recall that La Follette made any frenzied appeal for early and thorough investigation of the charges against him. The public can and often have borne patiently with their servants at the Capitol building who have lacked in many things, who have wasted our money in foolish appropriations; but there is one thing they will not tolerate and that is any question of loyalty on the part of a senator or congressman.

Why Tolerate Disloyalty?



CONGRESS has seen a great light, which in fact was of the thunderstorm type, with the storm area including that district between the Atlantic and Pacific. Therefore let it be set down here that on December 18, the House of Representatives, by a vote of 308 to 1 (largely reluctantly, yet efficiently) did repeal their exemption of the war tax on their own salaries. In doing so, however, they included the President, which same was neither called for nor desired by the country.

H. H. WINDSOR

December 19, 1917.

SIMPLE WAYS TO SAVE COAL

By W. K. JACQUES, M. D.

The war is making the fuel situation acute in many parts of the country and it behooves all members of the family to "put their heads together" to solve the problem. In zero weather, if there are any rooms that are not needed, their windows may be covered with corrugated paper. The basement windows may be covered also. Similar inside covers, that are removable, can be made for the north and west windows in used rooms and put in place at night.

In homes warmed by furnace or steam, the upper part of the rooms is very apt to be overheated, while close to the floor it is cold. One reason for this is that there are no adequate facilities for letting the cold air out of the room. In furnace-heated houses there should be a cold-air duct leading back to the furnace, about twice the size of the warm-air pipes.

In burning hard coal a big waste in fuel is often overlooked because it burns without smoke, the escaping gases being invisible. To consume hard coal thoroughly it should be very hot, and that requires a good supply of oxygen. As the burning of a mass of coal progresses, a coating of ashes forms over the top and sides, shutting out much of the air, while at night in mild weather, the fuel next to the sides of the fire pot often becomes so cold that it does not burn at all. If the furnace is shaken down in the morning, this unconsumed fuel drops through the grate and, on being covered with ash dust, is not noticed. Many a householder, if he will sprinkle a sample of his ashes, will be surprised to find that it contains 25 to 33 per cent good coal. In firing, if one side of the fire pot is covered with this mixture of ash and coal and the other with fresh fuel, the gases from the latter will burn more freely because of the extra amount of oxygen that is drawn into the fire pot through the half-burned fuel.

It is often preferable to use a one-toothed rake or hooked poker, to rake out the ashes between the sections of the grate, instead of shaking the latter. When the fire gets to burning well, the raking can be repeated until a few bright coals fall through.

Even though raking in the manner described lessens the waste, it is well to sift the ashes occasionally to see how much fuel is being discarded.

To lessen the amount of heat that escapes up the chimney, particularly with hard-coal furnaces, a longer smoke pipe is an excellent device. In one instance a big U-shaped addition was made, extending from the side of the straight smoke pipe. In cold weather

This Big New Railway Bridge across the Ohio River at Metropolis, Illinois, from Now On will Play an have been Used in America. On the Right Is the

a damper was turned which forced the smoke to travel the roundabout way, thus saving considerable heat.

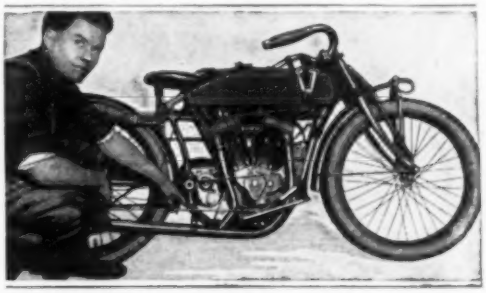
Finally, we must learn to get along with less heat. We may still have the sitting room warmed to 70°, but in the rooms where one sleeps or works a more healthful temperature is 50°. Houses kept at a high uniform temperature in all rooms are not healthful.

LARGE OHIO RIVER BRIDGE TO RELIEVE CONGESTION

War needs have hastened the construction of the big railway bridge over the Ohio River between the Illinois and Kentucky shores at Metropolis, Ill., with the result that the noteworthy structure will be entirely completed before the spring is well advanced. It will be recalled that the foundation consists of a series of seven caissons, 66 by 110 ft. in horizontal dimensions, sunk 75 ft. below the water, and that the piers, because of the wide range between the high and low-water levels, are 175 ft. in height. The bridge provides a new and much-needed outlet to the seaboard and permits the Chicago, Burlington & Quincy Railroad to make connections with the Nashville, Chattanooga & St. Louis Railway. It is particularly important at this time, for it will materially relieve traffic congestion at Cairo and St. Louis as well as lighten the pressure at other points.

SPRING-FRAME MOTORCYCLE HAS SHORT WHEELBASE

A spring-frame motorcycle, retaining all the comforts of a touring machine



Short, Racy Lines were Secured Chiefly by Bringing the Frame to the Rear of the Gear Box

but with the short wheelbase essential to high speed, has been successfully tested by a motorcycle dealer. It is 10 in. shorter than machines of standard design. Dimensions have been reduced chiefly by reconstructing the frame to bring the gear mechanism within the loop under the motor base. Short-frame motorcycles are in demand for use in races and various forms of road contests.

¶An officer in the medical reserve corps recently stated that he has found light and heat, combined, alleviate pain better than heat alone. Hence he prefers an incandescent bulb and reflector to a hot-water bottle as a means of temporarily relieving suffering.

Important Part in Lessening War-Time Freight Congestion. Its Caissons Are among the Largest That Illinois Shore, and across the River Is Kentucky

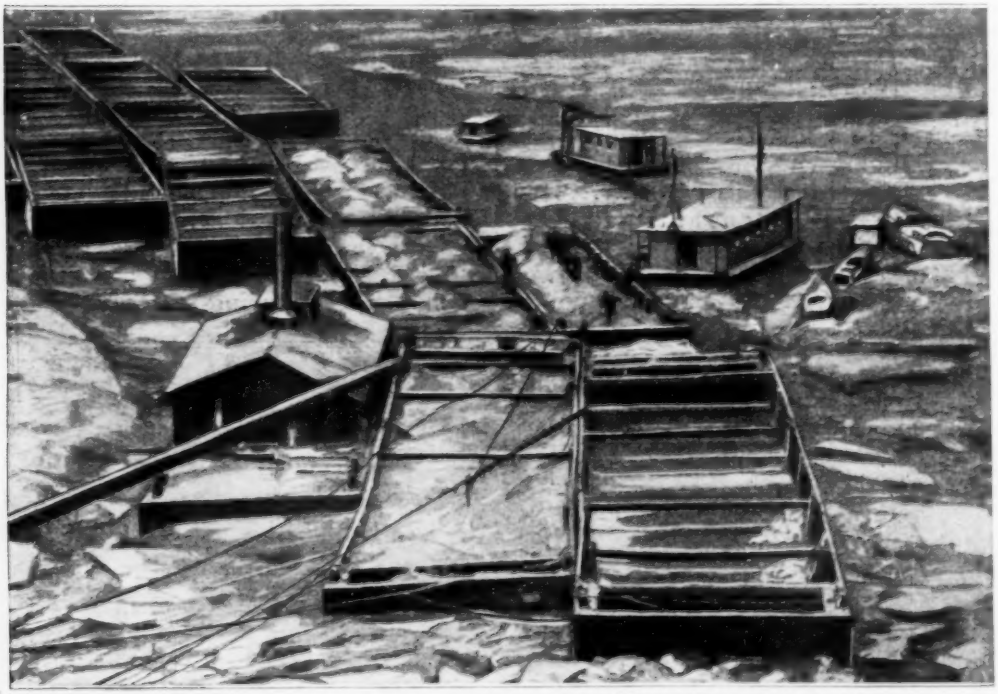
ILLUMINATED BAMBOO TREES ATTRACTIVE SHOP SIGN

By erecting its retail shop some 20 ft. back of the property line, a Los Angeles floral firm preserved two large clumps of bamboo which have since, by the installation of numerous incandescent lamps, been fashioned into towering electroliers. Low retaining walls surround the ground plots and flank the opposite sides of a broad passage to the shop entrance.

With Incandescent Lamps at the Tips of Their Long Slender Stems, the Bamboo Clumps Form Towering Electroliers at Night

"HARVEST" CROPS OF BRICKS FROM RICE FIELDS

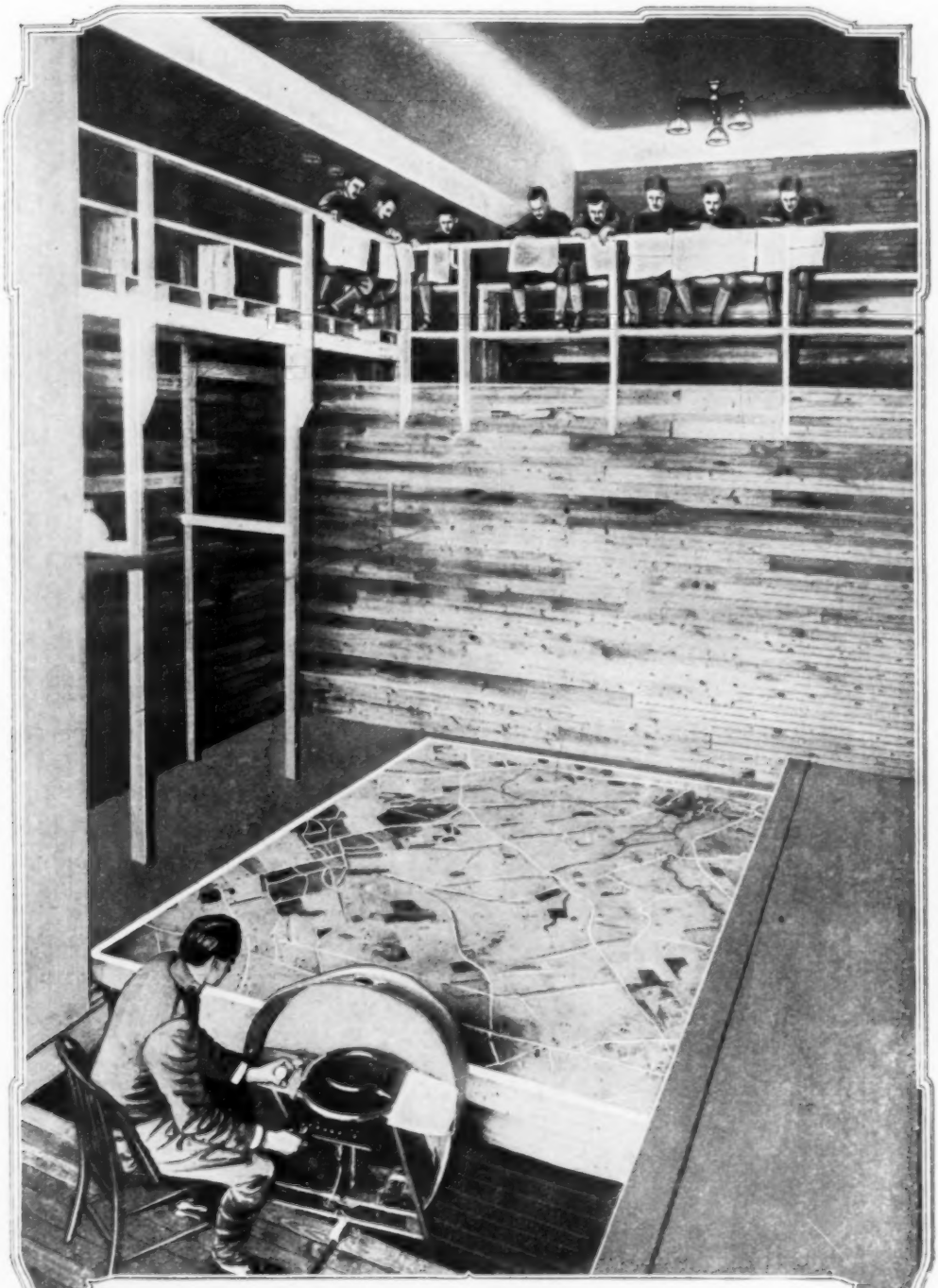
Immediately after a rice crop has been gathered in China, it is not uncommon for the owner to "harvest" a crop of bricks from the same land. This is done particularly in case it is desired to lower the level of the land, preparatory to adding fertilizer. The stubble is cut off close to the ground and the soil cut into sections about the size of bricks. On running a knife under these rectangles they are removed carefully and placed in the sun to dry. These are truly "bricks without straw," but in this case the fine rice roots serve as an excellent binder.



ICE MOVEMENT CAUSES LOSS OF MANY RIVER BOATS

HEAVY loss of property was occasioned in the vicinity of Cincinnati early last December by ice floes in the Ohio River. The break-up came before preparations had been made for it and resulted in the loss of many launches and houseboats at Bellevue, Covington, and Newport, Ky., and Cincinnati. A considerable number of barges operated by different coal companies were also destroyed. Boats caught in the floes were carried downstream against the bridge piers and sunk, while others were crushed in the ice.

INDOOR OBSERVATION TRAINING FOR AIRMEN



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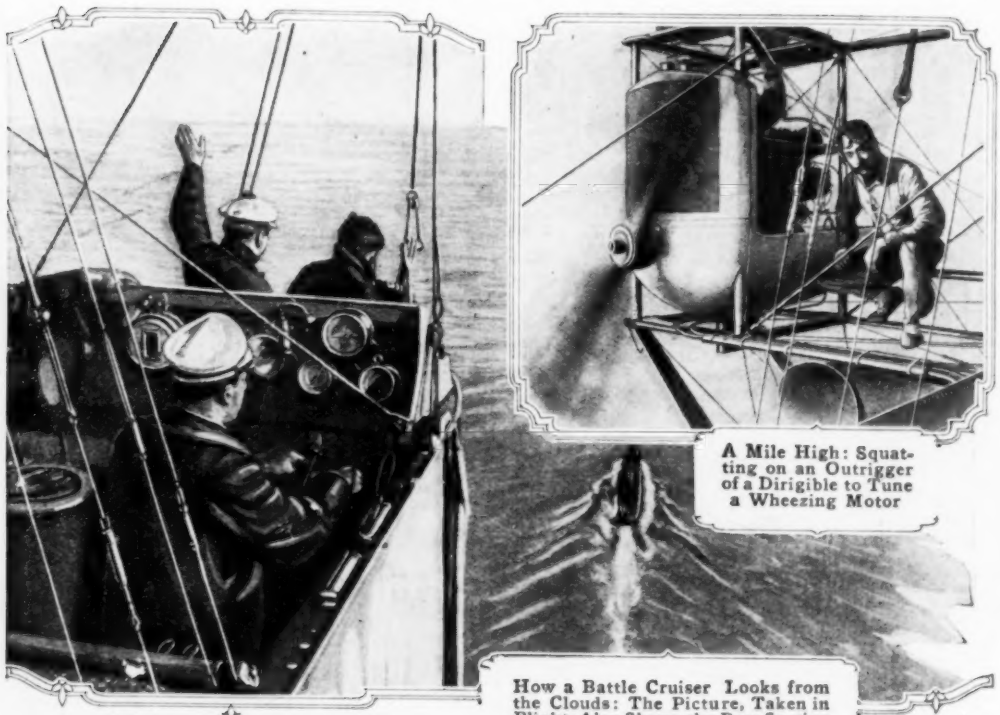
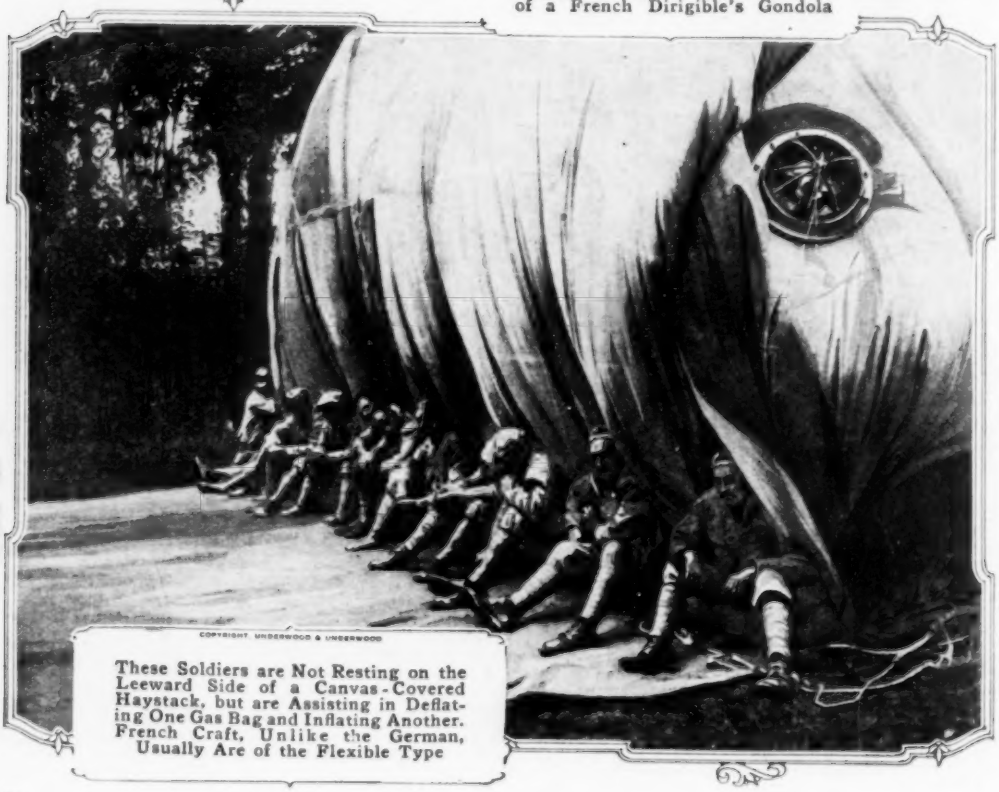
HOW students at American aviation schools are trained and their fitness for making military observations determined: From the gallery the map appears as would an actual battlefield from an elevation of 6,000 feet. While the instructor, following a stop-watch schedule, flashes colored lights on different parts of the chart to represent various kinds of artillery fire, the men above prepare radio messages giving the positions of the "hits." Their work is later compared with the instructor's schedule to determine its degree of accuracy.



A Mile High: Squatting on an Outrigger of a Dirigible to Tune a Wheezing Motor

How a Battle Cruiser Looks from the Clouds: The Picture, Taken in Flight, Also Shows the Bow Section of a French Dirigible's Gondola



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These Soldiers are Not Resting on the Leeward Side of a Canvas-Covered Haystack, but are Assisting in Deflating One Gas Bag and Inflating Another. French Craft, Unlike the German, Usually Are of the Flexible Type

WHO GIVE FAME TO FRENCH AIR SERVICE

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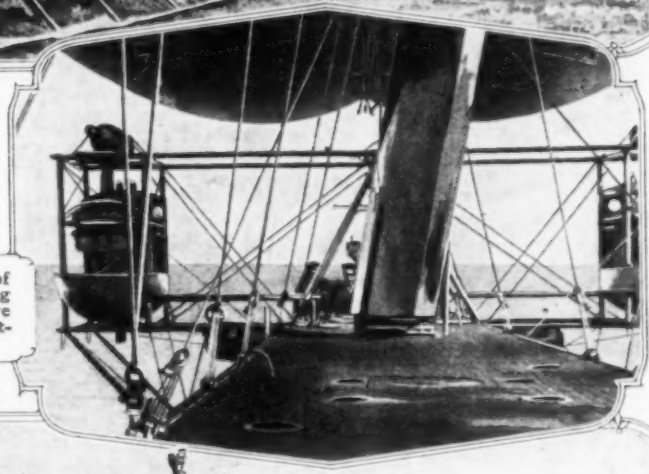
While Engaging Two Boche Craft, This French Biplane Burst into Flames. Nevertheless Its Crew Succeeded in Bringing Down the Enemy



Looking toward the Stern of a French Dirigible, Showing How the Dual Motors are Mounted on Opposite Outriggers

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Used by the French Aerial-Defense Service: A Powerful Armored Motor Car of Odd Appearance Equipped with a High-Angle Machine Gun

HOW TOMMY CARRIES ON WITH THE BOCHE

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British Foresters Cutting Timber for Road Building and Dugout Construction in Flanders

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A Surgeon Pauses to Take the Last Message of a Dying Tommy

General Byng's Surprise Attack Routed the Boche from His Rat Holes so That in the Vicinity of Cambrai the Cavalry Came into Action for the First Time in Many Months. This Shows the Horsemen Preparing for Word to Advance

GRIPPING PHOTOGRAPHS THAT SHOW HOW WARS'

ALONG WIDE FRONT IN WESTERN THEATER

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During Activities Every Hour Is a "Rush Hour" on Military Roads in France. Supplies and Fresh Troops Go Forward, Fatigued Men Retire, and Ambulances Dash Both Ways Ceaselessly

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Canadian Wiring Party on Way to Front Uses Indian Trick for Carrying Burdens

Australian Soldiers Studying an Elaborate Model of Their Sector, Covering an Acre of Ground, before Going into the Battle of Messines Ridge

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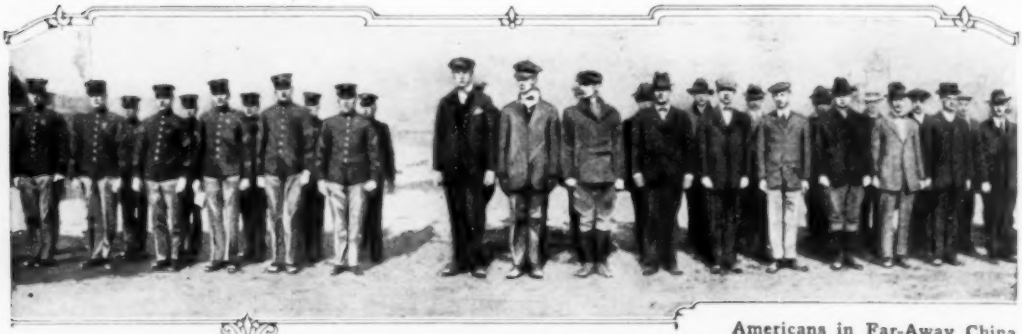
Lighting a Beacon That Guides British Troops in Their Movements at Night



Americans in Far-Away China
Men, Government Employes,
a Detachment of Marines. The
the United States

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A Heavy Boat in Transit on the Back of a Lone Arab, a Load That would Down the Average Man

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Carrying 90-Pound Shells on Their Heads: Portuguese Women Loading a French Munition Ship

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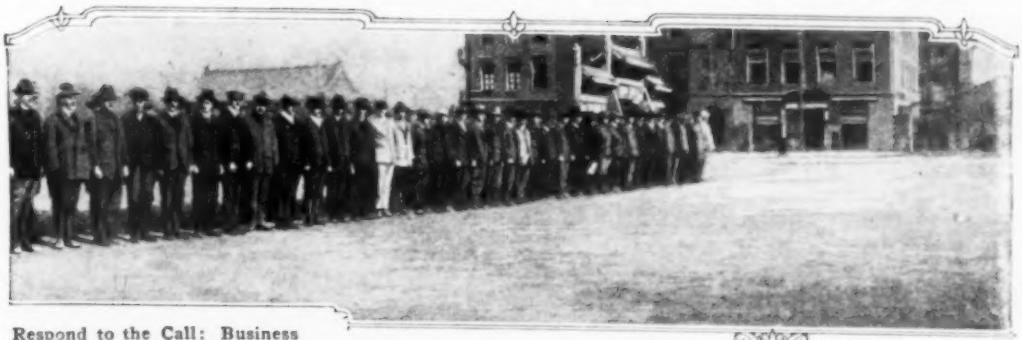
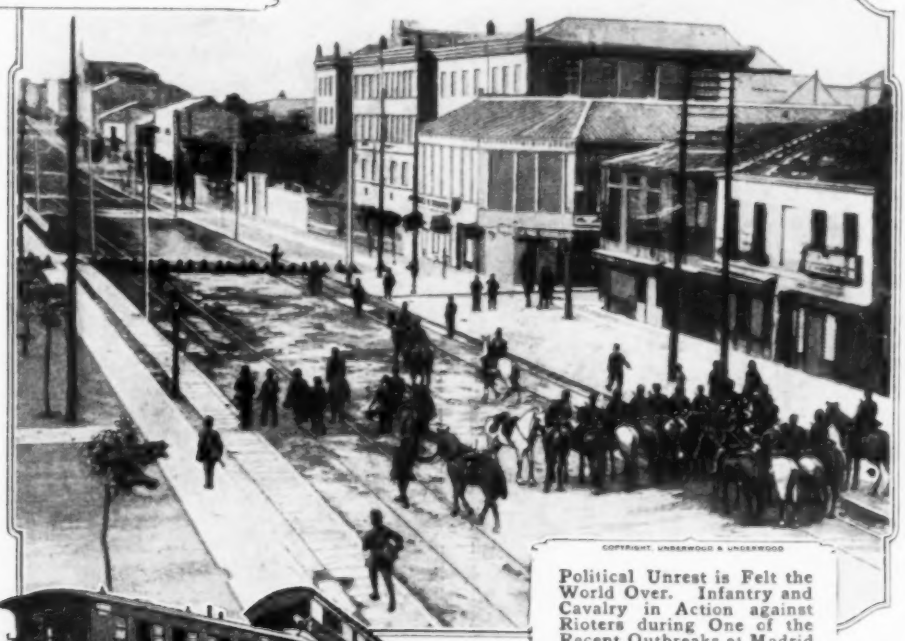
Work of the "Superman": The Magnificent Ypres Cathedral and the World-Famed Cloth Hall, Both Renowned Examples of Thirteenth-Century Architecture, as They Appear Today

WITH OUR ALLIES IN THE COMMON STRUGGLE

TENTACLES ARE ENCIRCLING THE WHOLE WORLD



Respond to the Call: Business and Missionaries being Drilled by Photograph was Taken before Legation at Peking



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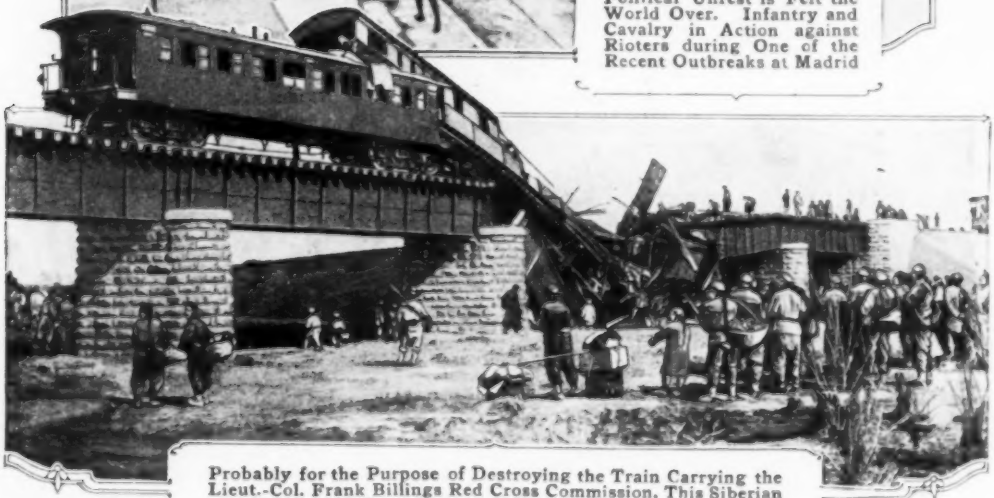
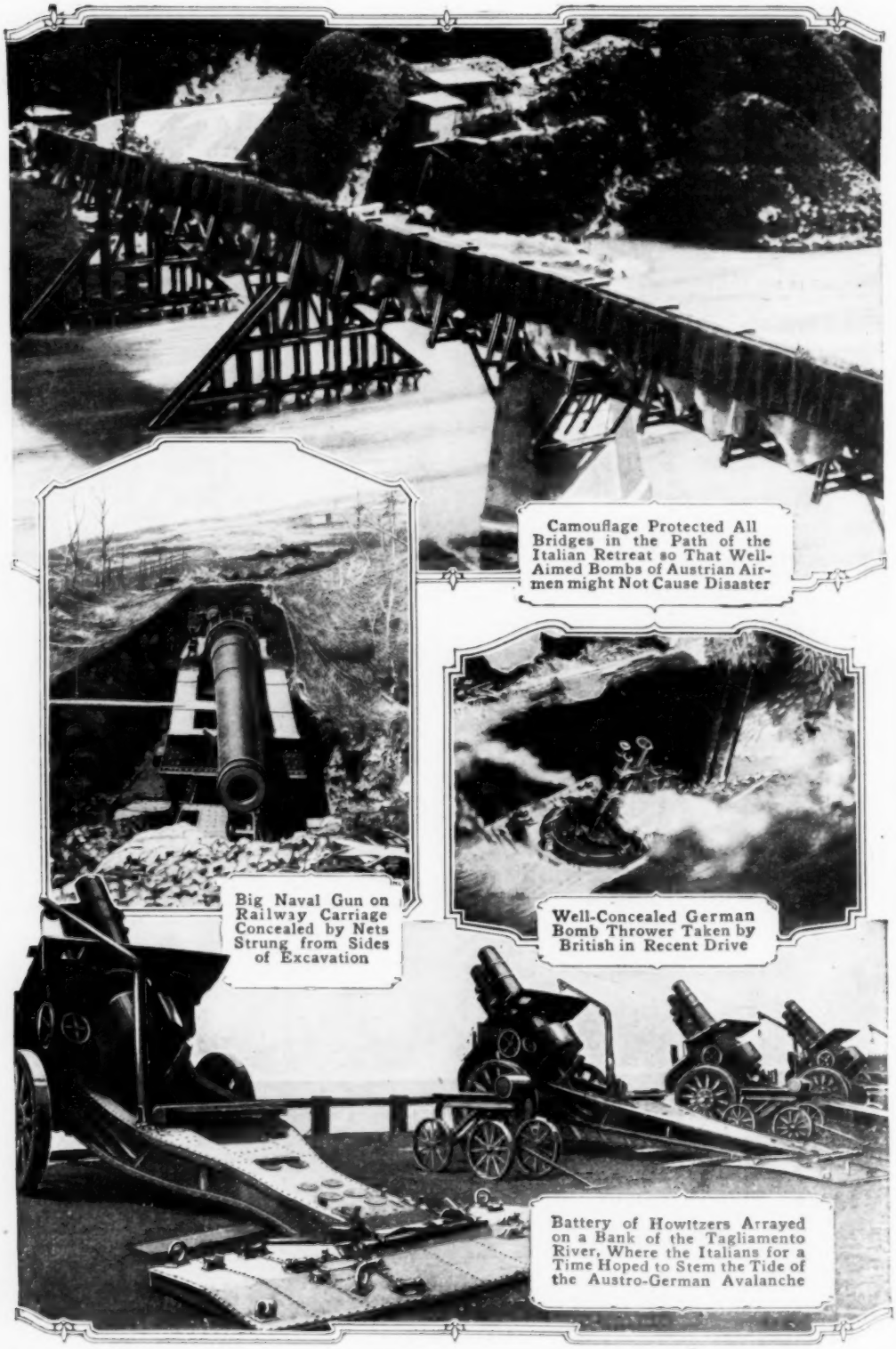
Political Unrest is Felt the World Over. Infantry and Cavalry in Action against Rioters during One of the Recent Outbreaks at Madrid



Probably for the Purpose of Destroying the Train Carrying the Lieut.-Col. Frank Billings Red Cross Commission, This Siberian Bridge was Dynamited and Another Train Wrecked

WITH OUR ALLIES IN THE COMMON STRUGGLE



Camouflage Protected All Bridges in the Path of the Italian Retreat so That Well-Aimed Bombs of Austrian Airmen might Not Cause Disaster

Big Naval Gun on Railway Carriage Concealed by Nets Strung from Sides of Excavation

Well-Concealed German Bomb Thrower Taken by British in Recent Drive

Battery of Howitzers Arrayed on a Bank of the Tagliamento River, Where the Italians for a Time Hoped to Stem the Tide of the Austro-German Avalanche

SAMMY "OVER THERE" AND CREPE AT HOME

Yankee Troopers in Training, Receiving Instruction in High-Angle Machine-Gun Firing

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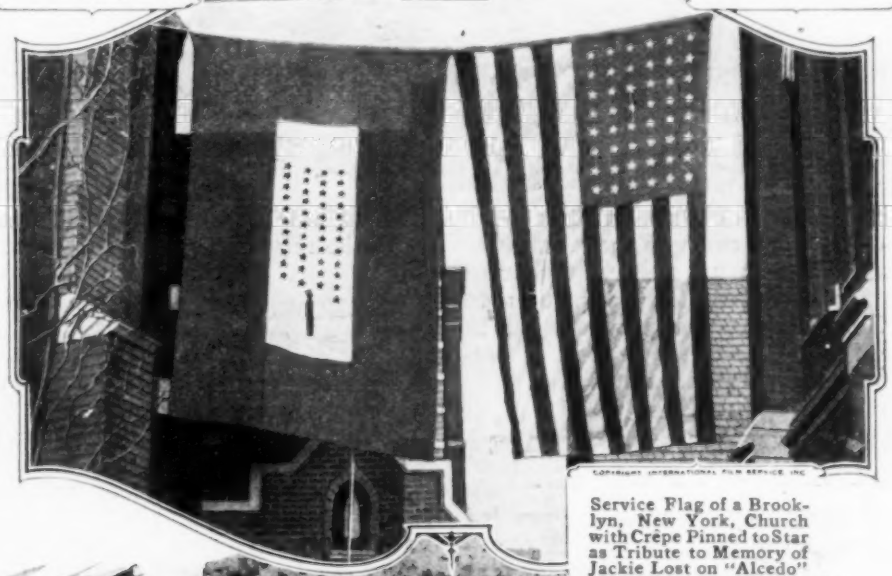
Officers of American Overseas Force Meet Canadian Officers at Front in France



Service Flag of a Brooklyn, New York, Church with Crepe Pinned to Star as Tribute to Memory of Jackie Lost on "Alcedo"

In the So-Called Quiet Sector: Some of Pershing's Men in a Trench Engrossed by the Sight of a Spirited Aerial Encounter High over the Battle Field

MOROCCAN REGIMENTAL FLAG RICH WITH WAR ORDERS

One of the Moroccan infantry regiments has so distinguished itself during the war that its standard has been decorated with every French military medal. Therein lies irony, in view of Germany's disgruntled opposition to the French-Moroccan program which more than a decade ago nearly precipitated a general European war.

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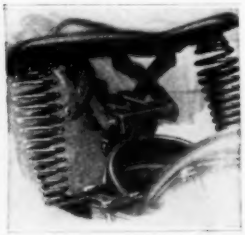
France has Bestowed upon This Moroccan Regimental Standard Every One of Its Military Medals in Tribute to the Gallant Fighting Done by the Colonials Enrolled under It

CANTILEVER MOTORCYCLE SADDLE GIVES COMFORT

A new motorcycle saddle is provided with cantilever supports which eliminate movement other than in a perpendicular direction. Obviously the shock-absorbing qualities of this construction are excellent, the life of the springs is prolonged, and the user is spared the discomfort and insecurity ordinarily attending the longitudinal, or side, action of the springs. These features are especially desirable for long tours.



TERM IN JAIL NO EXCUSE FOR HOMESTEADER

If a person taking up homestead land gets into trouble and is put into jail for his misdeeds, he cannot give this as an excuse for not complying with the residence clause of the homestead law, according to a special ruling recently made by the Department of Interior. At the same time, it is stipulated that a jail or prison sentence shall not be sufficient grounds for canceling the entry. Instead, all such cases are to be placed in a "state of suspension" until the prison term has been completed, after which the entryman who wishes to establish his title to a tract of land, must comply with the regular legal requirements.

ELECTRIC FAN RADIATES STEAM HEAT

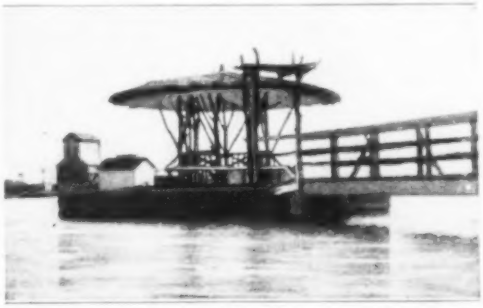
By directing the draft from an electric fan through a steam radiator a business man in a western city heats a cold office to a comfortable temperature in a very few minutes. The great volume of air circulated by the fan is heated in passing through the radiator, and the temperature of the room rises rapidly. In a recent zero-weather demonstration of this method of heating, a room of 3,240 cu. ft., in which the mercury stood at 40°, was brought to 80° in 10 minutes.

QUEEN "LIL" IS LAID TO REST IN ROYAL MAUSOLEUM

MUCH pomp and ceremony attended the funeral of Hawaii's former queen, Lydia Kamekaha Liliuokalani, some weeks ago, as is indicated by the photograph above, which shows the catafalque being borne between long rows of mourners to the royal mausoleum. Twenty years ago, when ruler of the romantic islands, the queen attempted to abolish representative government and set up an absolute monarchy. Her acts aroused popular ire, she was deposed, and a provisional government established. When the Republic of Hawaii was formed, Liliuokalani made her residence in the United States. Later, when the islands were annexed to this country, she returned to Honolulu, where she has since lived in retirement. Until recent years the one-time queen was bitter toward our government. Her generous subscriptions to the Liberty Loan of late, however, were taken as indication that the old feeling had given way to loyalty for the Stars and Stripes.

BAND STAND ORNAMENTS OIL RESERVOIR

The oil lake in the new town of Mannford, Okla., is quite unusual in that the big reservoir has been made a recreation place by erecting a band stand in its midst. The stand is sheltered by an artistic circular roof and is connected with the shore by a rustic bridge. Concerts are given here in warm weather for the benefit of the audience that assembles on the shore. One advantage possessed by this amusement center is that no mosquitoes are bred here. But there is, so to speak, a fly in the ointment, in that smoking is prohibited for obvious reasons, and when a thunderstorm is seen approaching during a concert, the crowd disperses unceremoniously, for the oil seems to have an attraction for lightning.



The Oil Lake at Mannford, Oklahoma, and the Ornamental Band Stand in Which Concerts are Given: For Obvious Reasons Smoking is Prohibited in the Vicinity of the Lake

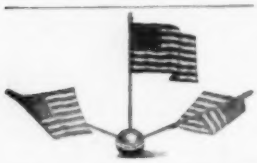
SHOE-SHINING PARLOR HAS ODD FEATURES

A shoe-shining parlor has been so constructed that the patrons, with the exception of their feet, do not come in contact with, or even in sight of, the polishers. Upon entering, the customer takes a seat at a rack well supplied with newspapers and periodicals and with his feet on rests at the base of a partition his shoes are shined as he reads or otherwise amuses himself. Change is made through a door in the partition. Obviously this parlor is more pleasant to the patron than the usual type.

The Patrons' Feet Extend under a Partition, as Shown at the Left, into the Shining Room, Shown at the Right. Doors in Front of Each Chair Serve for Making Change

FLAG NOVELTY FOR OFFICE, HOME, OR PLAYROOM

For the desk or table there is a wartime novelty that visualizes the phrase: "The flag that will never come down." It consists of a small American ensign fastened to a slender pole mounted atop a weighted sphere. Rocked to any angle, the banner returns to its proper position, mast upright.



TO MAKE SHIPPING SAFER IN CARIBBEAN SEA

Because of the increased amount of shipping that now traverses the Caribbean Sea going to and from the Panama Canal, the United States Weather Bureau is establishing 20 new stations in Panama, in various islands of the West Indies, and in Cuba, which will furnish daily weather reports by cable. From these reports weather maps and forecasts will be prepared that will doubtless prevent many losses, such as severe storms in this region have occasioned in the past. From November to May the Caribbean is subject to what is called "northers," while during the remainder of the year there are occasional hurricanes from the south. But for the war, which has interrupted cable service more or less, these stations would already have been in operation.

DISPLAY TEACHES BENEFIT OF ENRICHING SOIL

Agricultural experts at the University of Tennessee have prepared a most effective display for exhibition at county fairs, which shows at a glance the benefits to be derived from properly enriching the soil. A large map fastened to the wall indicates the five regions into which Tennessee is divided, with respect to the character of its soil. On the floor in front of the map are placed a pile of ground limestone and a bag of acid phosphate—two ingredients needed in various proportions to make the land capable of a maximum yield. Ribbons of various colors are stretched from these two substances to the five regions shown on the map and thence back to bags of grain placed in rows on the floor. The increase in production

GROW WAR CROPS
Tennessee's Best Soil Contains 10,000 lbs. Phosphoric Acid, 16,000 lbs. Lime, 8,000 lbs. Nitrogen Per Acre
Tennessee's Poor Soil Contains 1,500 lbs. Phosphoric Acid, 3,000 lbs. Lime, 3,000 lbs. Nitrogen Per Acre
SEE WHAT YOUR SOIL LACKS AND SUPPLY IT
Lime
Acid Phosphate

Scientific Agriculture at a Glance: This Soil Map of Tennessee and the Display Show How Much Limestone and Acid Phosphate should be Added to Various Regions and What the Consequent Increase in Yield would Be

which will result from enriching the ground as recommended is shown, in bushels per acre, by the number of bags of grain at the ends of the ribbons.

MOTION-PICTURE THEATER HAS ELABORATE FEATURES

A motion-picture theater has been erected in San Francisco which presents some features unusual in cinema playhouses. The most elaborate measures have been adopted to promote the comfort and convenience of its patrons. The building is a handsome Gothic structure. It is fireproof throughout and additional safety has been secured by the elimination of all stairs. The mezzanine floor is reached by inclined ramps. A lounge is provided on this floor where patrons who enter during the midst of a picture may wait until its completion. Potted plants, fountains, and elaborate furnishings make the lounge a model of beauty and comfort. Free telephone service is provided, and special attention has been given toward securing perfect ventilation and illumination. The theater represents an investment of nearly two million dollars.

This Motion-Picture Theater Cost Nearly Two Million Dollars and Is One of the Most Elaborate Ever Built

VISUALIZING THE FUND

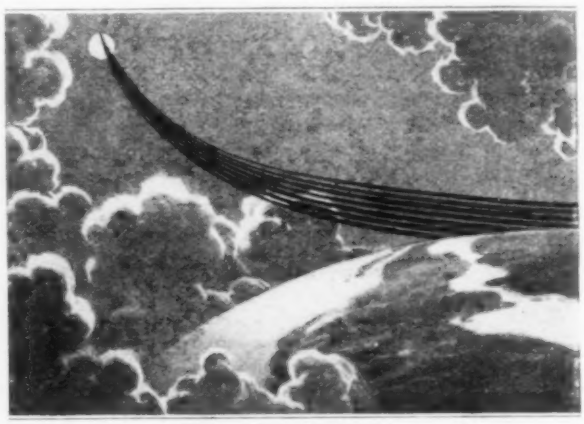
By LESLIE

THE last Congress appropriated, for the purposes of the war, $18,000,000,000, which is said to be the largest sum ever appropriated by any parliament at a single session. Nothing but the incomparable wealth and the elsewhere unequaled resources of our bountiful country, made such an appropriation possible.

It is the purpose of this article to present some tangible idea of the hugeness of the expenditure that the American people will make in order that (in the words of their most loved hero) "government for the people and by the people may not perish from the earth."

To begin with, let us form some definite and concrete conception of the mere bulk of the money itself. If the $18,000,000,000 were to be coined into $5 gold pieces, and if these $5 gold pieces were to be laid face to face, as are the pennies that one gets in packages at the bank, they would form a golden rod over 3,000 miles in length.

If the $18,000,000,000 were coined into pennies and treated in a like manner, you would have seven great copper cables, each long enough to form a mighty telegraph main to connect us with the moon, even though she is 240,000 miles away.

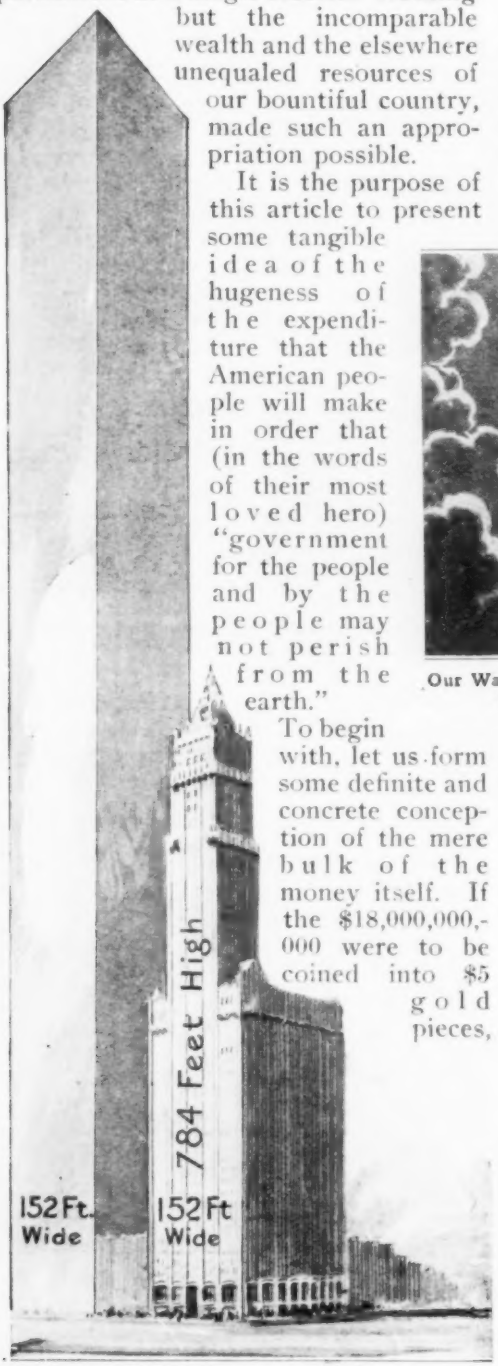


Our War Appropriation, if Coined in Pennies Placed Face to Face, would Form Seven Copper Cables Long Enough to Reach to the Moon

If the vast sum were made into one-dollar bills, there might be constructed a path of them, 15 in. wide, which would extend nearly 17 times around the earth at the equator. These bills would also completely cover or "paper" 99 square miles of ground.

If gathered into a heap of pennies this vast sum would make a column 152 ft. square, over 1,400 ft. high, or nearly twice the height of the Woolworth Building.

If we were now to recoin our $18,000,000,000, this time into silver dollars—and were to spread them on the ground—and if a man were to come along and think he had hit upon a silver mine and start to pick them up, how long would it be before he could accomplish his task?



Eighteen Billion Dollars' Worth of Pennies would Form a Column 152 Feet Square and About Twice as High as the Woolworth Building in New York

$18,000,000,000 WAR FOR 1918

KLUG

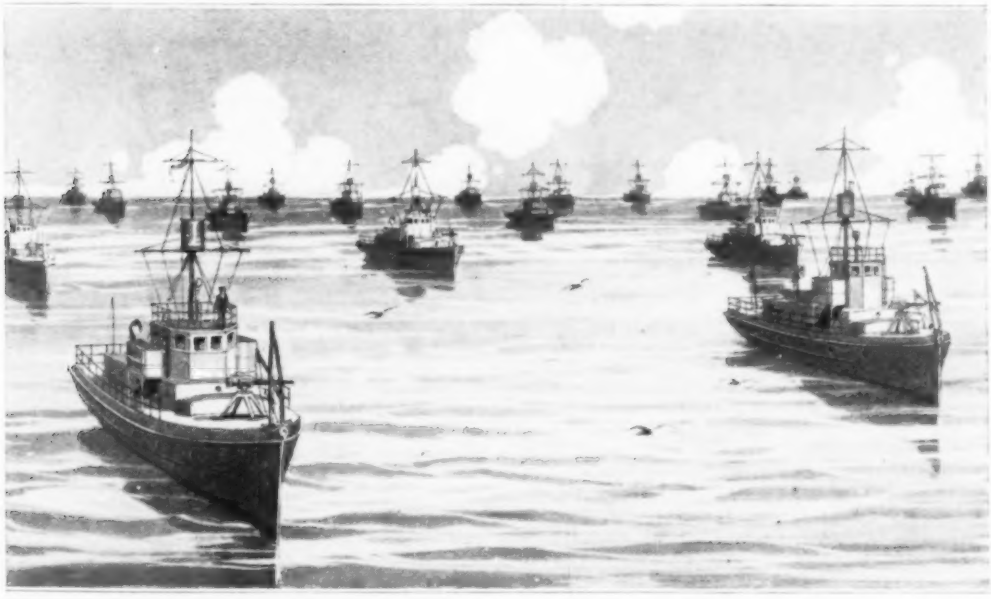
Well, if he could pick up the dollars at the rate of one hundred a minute, and could maintain that pace for 10 hours each day, it would take seven more men after him, each working for one hundred years, to complete the job.

If now we consider this $18,000,000,000 with relation to work that it would pay for, we are compelled to deal with figures just as startling.

Let us take as an example the Panama Canal, which is, probably, as costly a single piece of work as was ever undertaken. Nevertheless it cost but $350,000,000. The appropriation would build 51 of them, or would build a single one of equal width and depth that would reach from San Francisco to Lake Erie a distance of approximately 2,000 miles.

Suppose we turn our attention to the much-talked-of "mosquito fleet" to be built for the purpose of exterminating the submarine and protecting our merchant commerce. As is known, the ships of which the mosquito fleet was to be comprised were to be compar-

Eight Men Scooping 100 Silver Dollars a Minute 10 Hours Each Day would Work 100 Years to Gather an $18,000,000,000 Harvest



If Devoted to Their Construction, the War Appropriation would Provide 360,000 Submarine Chasers Costing $50,000 Each. Such a Fleet would Have under Observation Every Square Foot of Ocean Surface between the Coasts of North America, Europe, and Africa

atively inexpensive, costing only a few thousands of dollars each. Even were we to allow $50,000 for the construction of each one, our $18,000,000,000 would nevertheless build a fleet so enormous that it would have in it 360,000 of these vessels.

Such a fleet would "man" a lane stretching all the way across the Atlantic and 100 miles wide, in which there would be one ship for each square mile; or it would so completely cover that entire portion of the Atlantic that lies directly east of the American shore, that there would not be one square foot of the ocean's surface, all the way to the European and African coasts, that would not be under the direct observation of some boat in the fleet.

Over all this expanse of water there would be no ship wholly lost to the view of all the others. On the contrary, they would form a great and wide continuous chain, one vessel within sight of another. To man such a fleet would require approximately 3,600,000 men, who would compel a pay roll of perhaps $180,000,000 a month. We dare not even consider the coal consumption at the present high prices.

We have talked recently of building a fleet of 20,000 aeroplanes for the purpose of invading Germany, and a part of the appropriation was made toward that end. The total appropriation, however, would build a fleet of considerably more than a million aeroplanes which, could we ever find airmen enough to fly them all, would, in but a matter of a dozen attacks, lay waste the entire face of Germany and leave not a building standing nor a growing field undestroyed.

Did we prefer, we might, with the same amount of money, construct about two million British tanks, by means of which we could annihilate the entire German army.

If it be asked by some credulous person why we have not already attempted some of these things, the answer is simple enough. It is merely because the cost of maintaining any one or a combination of these units would be prohibitive. Nearly all these considerations have had to do with the weapons and agents of war. Suppose that you and I were merely peaceful pioneers looking only for land in which to invest our comfortable inheritance of $18,000,000,000: We couldn't go after $1.25 government land, because there isn't

If There Were Men Trained to Pilot an $18,000,000,000 Air Fleet, America could Destroy Every Building and Growing Field in the Whole of Germany within a Few Days. Victory would Require Merely a Dozen or More Attacks from the Western Front

In View of the Splendid Fighting Done of Late by British Tanks, It Is Not Difficult to Imagine the Havoc That 2,000,000 Steel Monsters could Work with the German Army. Such a Fleet would Cost About $18,000,000,000, It is Estimated

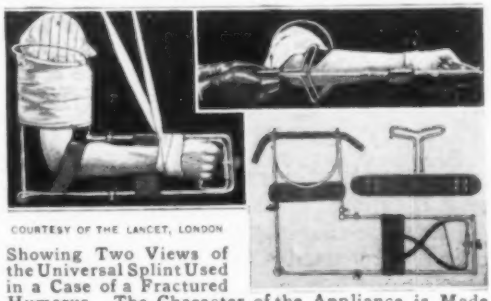
enough of it on earth. We wouldn't be able to confine our farm within the limits of a single continent, even if there were some wholly unoccupied continent that we could buy up. Our ranch would be almost five times the size of the United States.

We must be resolved then to pay civilized prices. Well, at $100 an acre, we might put an end to the world war by going over and buying up the whole of Germany, which we could just nicely accomplish and still have enough money left to maintain the kaiser on a shooting park for the balance of his days.

These figures are set forth only to give some representation of the magnitude of $18,000,000,000. They may, however, be taken also as some indication of what America can really do when she has finally cleared herself for action in the tremendous conflict across the seas.

STANDARDIZED SPLINT MADE FOR ALL ARM FRACTURES

For field-service work a British surgeon has evolved a universal splint suited for any typical fracture involving either of the arms. Its distinct advantages have led to its quick adoption by a number of practitioners at the front. Essentially it is an adjustable galvanized-wire cradle splint supplied with detachable rubber bands and a few simple attachments. When in place, it does not interfere with access to wounds or dressings. Furthermore, the rubber bands may be detached for sterilization without disturbing immobilization, or the entire apparatus may be sterilized or placed in an arm bath. It provides for the gradual extension of the fractured parts and is said to relieve pain materially.



COURTESY OF THE LANCET, LONDON

Showing Two Views of the Universal Splint Used in a Case of a Fractured Humerus. The Character of the Appliance is Made Apparent by the Illustration at the Side

HOUSE BUILT ON HILLSIDE HAS TUNNEL ENTRANCE

Difficulties and costly alterations attending the erection of an apartment house on a hillside lot have been avoided by means of an underground entrance. The basement, which is also made into several apartments, is level with the street and is reached by a concrete-lined tunnel through the retaining wall and under the front lawn.

GIGANTIC PAPUAN BEANS THRIVE IN AMERICA

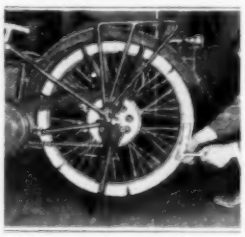
A bean of fairy-tale proportions has been successfully introduced in the semitropical portions of the United States from Papua. Specimens grown here have attained a length of 35 in. and a weight of 11 lb. Unlike other beans the pod alone is edible. It is prepared like eggplant, but its flavor is said to be even superior to that vegetable. The Papuan bean is extensively cultivated in Japan. There it is prepared in many ways, and is also sun-dried for winter use.

TALKING MACHINES AID SHOE-SHINING PARLOR

Talking machines have been adopted as a means of stimulating the business of a shoe-shining parlor. Two machines are used for the purpose. A small machine used as a "ballyhoo" is connected with a hole in the front window so that the sounds are thrown entirely into the street. It shouts continually to pedestrians: "Get your shoes shined. Helps you win favor." The other machine, a better instrument, serves to entertain patrons inside while having their shoes shined. The adoption of this method has greatly increased business.

MOTORCYCLES EXPORTED WITH WOODEN TIRES

Wooden tires that are readily detachable are now standard equipment for motorcycles being exported from the United States to the neutral countries of Europe. International treaties prohibit the exporting of rubber tires to these countries. Without the wooden tires machines could not be handled on their own wheels without damaging the rims. The neutrality of the nonbelligerent nations of Europe is being so closely guarded that a tire manufactured there cannot be purchased without a permit from the authorities. Before such a permit is issued it is necessary to give satisfactory evidence that the tire is for one's own individual use and under no circumstances will be allowed to get into the hands of the Germans.



STABILIZED MOVIE CAMERA FOR WAR PHOTOGRAPHERS

For the use of our official war photographers a gyroscopically stabilized moving-picture camera, developed a couple of years ago by a noted naturalist for difficult work in the South African jungles, has been adopted by the photographic division of the signal corps. The instrument, described in this magazine at the time of its invention, is of all-metal construction and weighs 20 lb. When a tripod cannot be used and no substitute support is available, it can be held in the hands and success-

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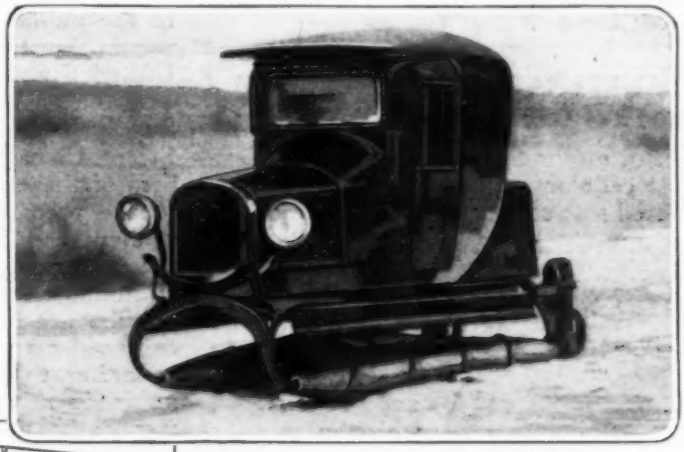
The Camera Focused on an Aeroplane: Developed by a Naturalist, It has been Found Well Suited for the War Photographer

In the Hands of an Official War Photographer: The Cylindrical Camera Equipped with Telescopic Lenses and Mounted on a Special Tripod

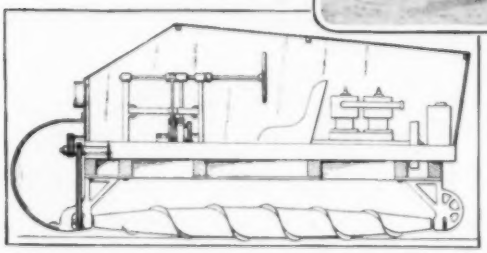
fully operated. It is designed to permit quick adjustment to almost any angle and is fitted with a panoramic arrangement that enables it to be swung in different directions with steadiness and uniformity of speed. Because especially built to withstand the rigors of exploration trips and to meet the particular demands of a scientist for wild-animal and bird photography, it has been found excellently suited for the difficult work of the war photographer.

AUTOMOBILE SLEIGH USES NOVEL SCREW RUNNERS

For the snow-packed highways of the North, a motor sleigh has been equipped with revolving spiral-flanged runners, instead of the usual spiked wheel or aerial propeller. The members are cigar-shaped and mounted parallel in the customary manner. The machine is steered about the same as a tractor supplied with creeper treads. By turning a wheel, for instance, a clutch is disengaged so that one of the spirals remains stationary while the other revolves. This arrangement enables a driver to turn the vehicle in its own length.



Whirling Spiral-Flanged Torpedo Runners Carry the Sleigh Coupé over the Snow

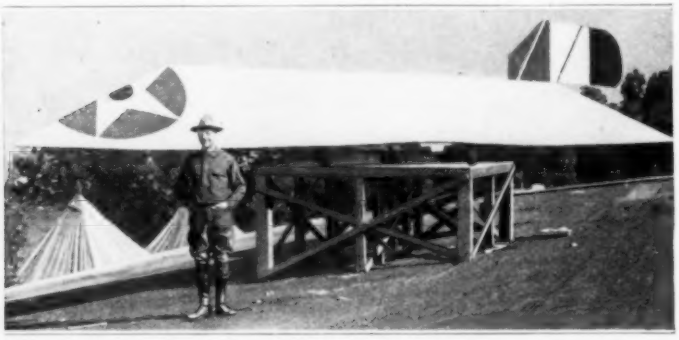


Plans of the Motor Sled Showing General Details of Its Arrangement and the Way Its Spiral Runners are Mounted and Propelled

¶A young woman in Cheshire, England, has been appointed acting surveyor to a local rural council, to take the place of her brother who is a soldier.

INDICATOR AIDS AIRMEN TO LAND AGAINST WIND

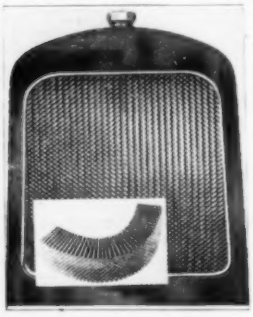
To point out to cadet airmen the direction in which they must travel to make landings against the wind, a most unusual type of weather vane has been devised. The structure is built much like the body of a plane and is mounted on a roller table on the roof of a building in such a manner that its nose always points against the wind. The sloping sides render it conspicuous from the air.



This Conspicuous Weather Vane Shows Student Airmen How They must Fly to Land against the Wind

ANTILEAK RADIATOR CORE HAS GREAT FLEXIBILITY

For motor cars and aeroplanes a flexible cellular radiator core made of tin-plated soft copper that is puckered into shape, instead of being stretched or drawn, is coming into use. The purpose is to obviate breakage and leakage, which commonly result from shocks and freezing. Without injury the core can be bent until it assumes the appearance of an open accordion. Instead of bursting when frozen, it is claimed that the water tubes merely expand into the air passages.



JAPANESE TO MANUFACTURE CELLULOID SUBSTITUTE

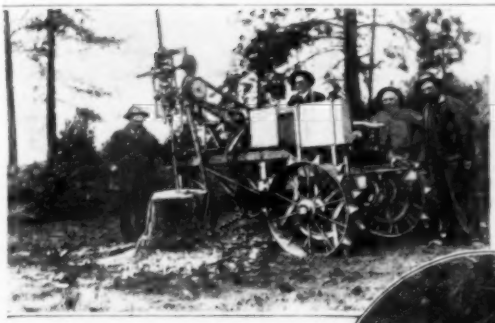
An incombustible substitute for celluloid, which was invented by a Japanese university professor some time ago, has been found so satisfactory that a company has been organized in Japan to undertake its manufacture. The new product is made from soybean cake, formalin being employed to produce a durable, hornlike substance. According to reports it can be made more cheaply than ordinary celluloid and in many other respects is preferable to the combustible product.

GOVERNMENT NEEDS WHITE MICE—HAVE YOU ANY?

One of the most unusual appeals that government authorities have made to the public is contained in a recent urgent request, issued on behalf of the United States Army, for white mice. The officer in charge of the Medical Supply Depot, U. S. A., at 3930 Federal Street, Chicago, states that large numbers of these little animals are needed in the preparation of serums for the soldiers, and that the present supply is wholly inadequate. Persons who have white mice that they might dispose of, or who are in position to raise them, can render an important service by responding to this appeal. Those engaged in raising these creatures have frequently found the task a very interesting one.

FARM TRACTOR SAWS WOOD AND DESTROYS STUMPS

A farm tractor which operates a saw, and is also provided with a boring mechanism for the destruction of stumps, is now being used for the clearing of logged-off lands in a Rocky



The Combination Tractor Boring Two Holes in a Stump Simultaneously

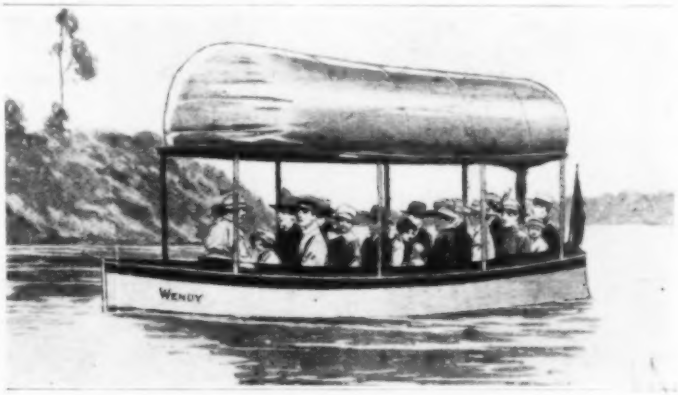
The Tractor Saw Attachment being Used to Cut Up a Log

A Cavity from Which a Stump has been Removed

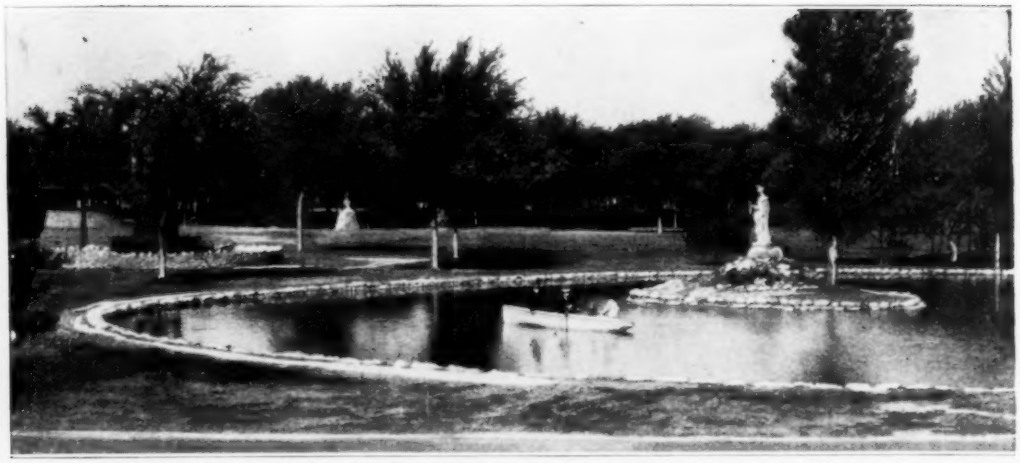
Mountain state. When in use as a tractor, the vehicle is applicable to any of the conventional uses of such machines. The saw attachment permits both the felling of trees and the cutting up of the logs. The boring machinery comprises two 3-in. augers that simultaneously bore a vertical and a horizontal hole which meet in the roots of the stump. By the holes thus bored a vent is secured so that the entire stump with its roots may be burned out.

MOTORBOATS IN ENGLAND OPERATED WITH COAL GAS

Great Britain's gasoline shortage has forced motorboat owners to emulate automobilists and cyclists to the extent of utilizing coal gas as engine fuel. A 25-ft. launch on a small artificial lake at Hull, for example, carries one of the now familiar, but still cumbersome, gas bags on top of its canopy. The craft gives many pleasure seekers a trip over a course that is less than a mile in length. One filling of the gas container suffices for five or six of these short runs. Because the lake is sheltered and excursions are not made during inclement weather, it has been found safe to navigate the craft with the big "sausage" attached. During a period of three weeks, last fall, 7,000 persons were carried. Another launch similarly equipped has been used on the river at Middlesborough. Use of the unwieldy flexible containers, however, may be short-lived in view of the recent invention of a fabric-and-rubber cylinder that does not present the objections of a steel tank and is able to carry gas at a pressure of 1,600 lb. to the square inch. Such a container if properly devised would be far more satisfactory for motor conveyances of all types than the contrivances now employed. Until after the war coal gas may continue to be the popular motor fuel in Great Britain.



Using Coal Gas for Fuel the Little Craft Carried Some 7,000 Passengers during a Period of Three Weeks Last Fall

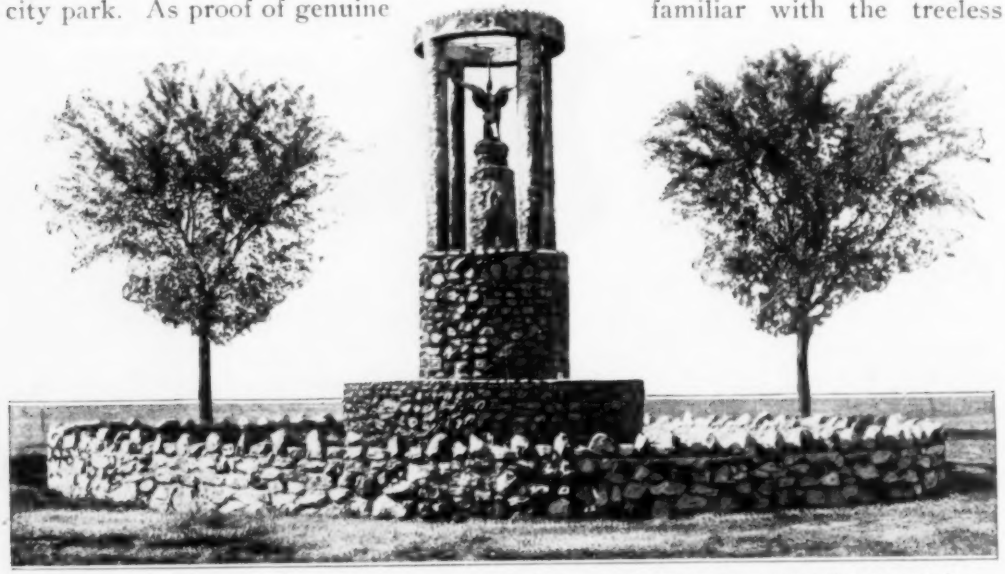


General View of the Lake in Wamego's City Park: Seventeen Years Ago This Spot Was Devoid of What Civic Pride and Coöperation

TOWN DISPLAYS ITS CIVIC SPIRIT IN FINE PARK

THE town of Wamego, in northeastern Kansas, has demonstrated in a most attractive manner that neither bigness nor great resources are necessary for a community to provide distinctive features. This municipality—whose population in 1910 was about 1,700—possesses a waterworks plant, an electric-light plant, and macadamized streets, but its especial pride is in its 12-acre city park. As proof of genuine civic spirit it rivals the recreation places in cities many times the size of Wamego.

About 17 years ago when the land was purchased for a park, at a cost of $2,525, it was utterly devoid of trees and improvements. Today half of the area is beautifully shaded with over 500 trees, representing 30 varieties, and 250 shrubs including many different species. Only one who is familiar with the treeless

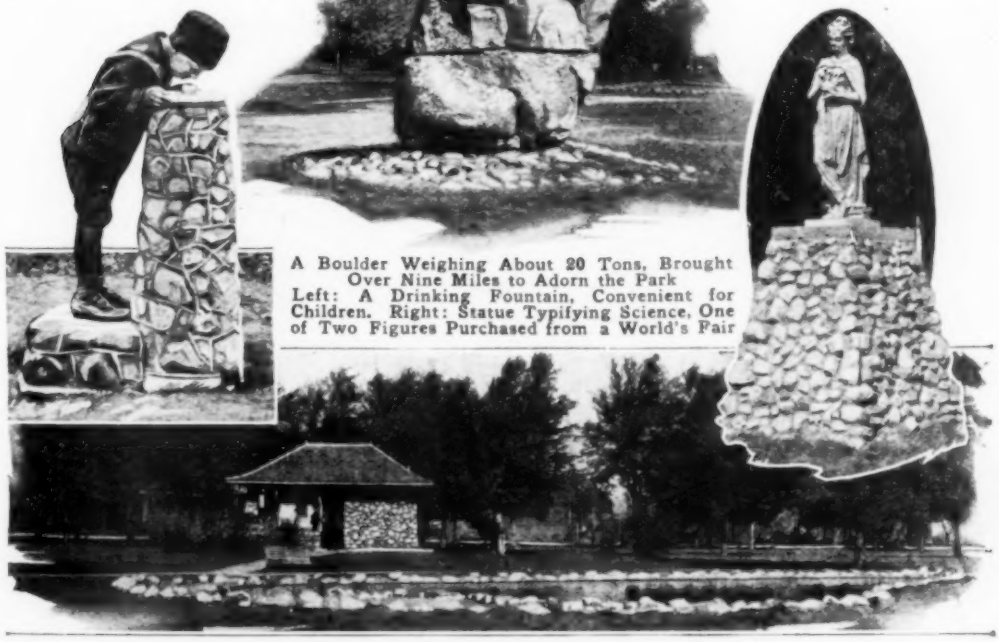


The Effect of This Fountain is Heightened by the Fact That the Border Is of Red Stones and the Central Structure of Black Stones

of Trees and Improvements. With Its Varied Recreation Facilities, It Is a Striking Example can Accomplish in a Small Community

plains of Kansas can understand how much this feature means to the town. A lake, nearly two acres in area, furnishes facilities for boating and bathing. Other improvements are a band stand, a woman's comfort station, drinking and ornamental fountains, and a well-equipped children's playground. Two statues, one typifying Science and the other Art, were purchased from a world's fair.

The enthusiasm shown by the entire community in coöperating to beautify this park adds much to the citizens' enjoyment of it and makes young and old personally interested in its upkeep. Instead of relying on tax money entirely



A Boulder Weighing About 20 Tons, Brought Over Nine Miles to Adorn the Park
Left: A Drinking Fountain, Convenient for Children. Right: Statue Typifying Science, One of Two Figures Purchased from a World's Fair

A Rock-Bordered Wading Pool for Children, and the Women's Comfort Station, Where a Matron Is in Charge in the Summer

The Substantial Band Stand Erected at a Cost of $1,000

for securing improvements, private organizations have made several generous contributions. The young married women of the town organized a ball team which played a series of games against a nine of unmarried women, and the proceeds were devoted to the purchase of ornamental - iron seats. A grand stand, with a capacity of 300, was given by the boys' baseball teams.

FRENCH NOW RE-USE SOILED ABSORBENT COTTON

Through the ingenuity of a French chemist who was struck by the fact that in the military hospitals of Paris alone about 4,400 pounds of absorbent cotton was used daily, a process has been developed which makes it possible to use soiled cotton a second time. Material very badly soiled is sorted out at the hospital, while the rest is placed in hermetically sealed metal containers so that it can be transported to a central establishment with entire safety. Here the first step in the treatment is the removal of all grease by boiling 10 or 12 hours in a soda solution, or by treating it under pressure for three hours in a sealed container filled with the same solution. After this the cotton is thoroughly washed in a machine, and all the moisture removed by placing it in a high-speed centrifugal drier. Drying is followed by bleaching with hypochlorite of lime and a second

A Very Pleasing Landscape Effect Obtained at Comparatively Small Cost

The Children's Playground in an Elm Grove That may Well Be the Envy of Larger Towns. The Substantial Equipment Provides a Variety of Diversions for the Youngsters

washing and drying. Finally the purified product is carded, packed, and again sterilized. For over a year a large plant has been recovering 48,000 lb. of cotton per day by this process, receiving the soiled material free from the government and selling it back for about half what the "new" cotton from America costs.

IRIS DIAPHRAGM DETERMINES FINGER-RING SIZES

The fitting of rings is simplified by an iris diaphragm by which fingers are accurately and instantaneously measured and the size recorded. The diaphragm is housed in a metal case and is expanded or contracted by moving a tiny lever at the side. After being adjusted to the finger the measurement is read from a recording dial at the top. The convenience to jewelers is apparent.

SPRING-SUPPORTED GOOSE RELIEVES TAILOR'S BACK

To relieve tailors of the strain and backache incident to the constant wielding of a heavy pressing goose, a system of spring supports for partly lifting the weight has been produced. The springs are mounted on a roller frame above the pressing board so that freedom of motion is unimpaired.

¶ A new auto tractor has recently been brought out in Sweden which can be guided from either end, there being driving and steering gear on all four wheels.

TEMPORARY MOTOR LICENSE ISSUED BY POLICE

Purchasers of motor vehicles in Portland, Ore., are spared embarrassment by a system of temporary police licensing. Pending receipt of the permanent license the motorist uses his car under police registration. The charge made for the temporary license is refunded when the number plate is returned by the owner upon acquiring an annual license.

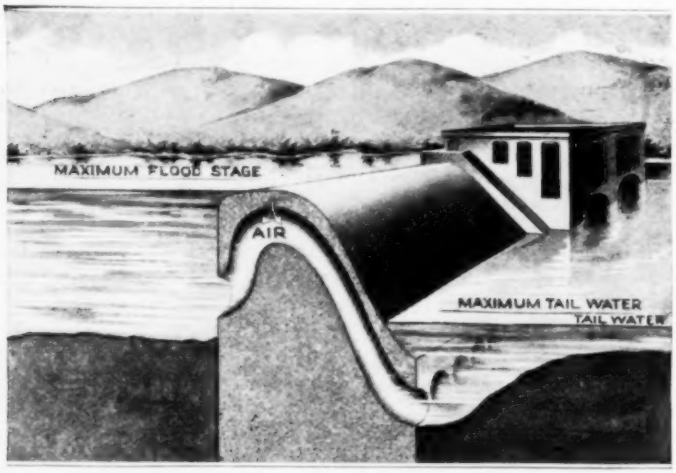
NEW INKWELL PREVENTS EVAPORATION OF INK

An improved type of inkwell, which prevents the clotting and waste of ink caused by evaporation, is provided with a bulblike glass chamber in which the fluid is kept. This bulb is screwed, with its mouth downward, into an ornamental metal base. The vacuum created by inverting the container permits only a small portion of the ink to flow from the bulb into the well, and the snout into which the writer dips his pen.

DAM WITH AIR LOCKS INSTEAD OF GATES

Plans have recently been worked out for a new type of power dam in which air locks take the place of a valve or gate control. The locks consist of conduits passing through the dam, each having an intake higher than the outlet and following an upward curve so that it resembles a siphon. By means of a pipe extending from the power

house to the highest part of each conduit, air may be forced into the latter passages at sufficient pressure to prevent the flow of water, the effect being the same as closing a gate. An advantage claimed for the air valves is that when pressure on the intake, caused by rising water, becomes excessive, the water will force its way through the passage. Ease of operation is another feature sought by the designer.



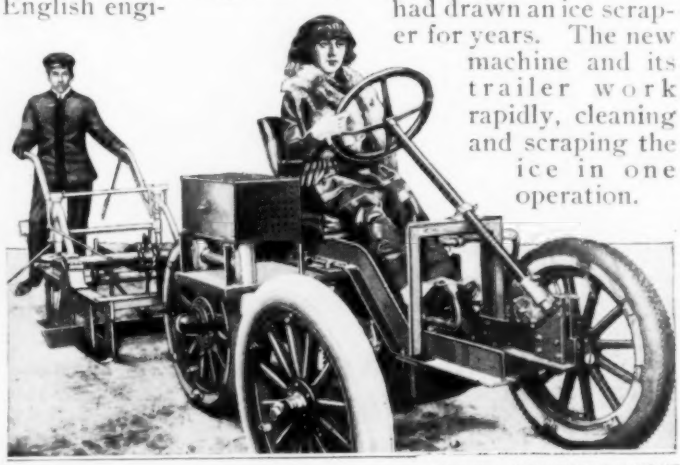
Proposed Type of Dam in Which Siphonlike Conduits, Connected with a Compressed-Air Supply in the Power House, are Employed to Regulate the Flow of Water

RIVER BURIED UNDER PARK FOR SAFETY OF AIRMEN

In converting Hanworth Park, Feltham, into an aerodrome, English engineers have buried a section of a small river that for nearly three centuries has supplied water to the fish ponds in the grounds of Hampton Court Palace. The stream, known as Cardinal River, bisects the park, and at the point where the work has been executed was about two feet deep and 30 feet wide. The bed, an artificial one built early in the seventeenth century, was above the level of the surrounding ground. This prevented the otherwise simple procedure of covering the stream, for airmen need a field that is free from all obstructions. A reinforced-concrete, inverted double siphon was installed to carry the water beneath the prospective aeronautical field. The conduit is 1,055 ft. long and designed to handle a 27,000,000-gal. flow daily. Surplus water is carried off by a weir provided above the intake. The purpose of having a double siphon is to facilitate cleaning. Another section of the stream, 560 ft. long, is to be covered in the future. For this work, however, removable concrete beams will be employed as supports for a 4-in. timber decking.

ELECTRIC TRACTOR DRAWS ICE SCRAPER IN RINK

An event calling to mind the decline of the horse in favor of motor vehicles was the recent purchase of an electric tractor to be used in an eastern skating rink in place of a faithful beast that had drawn an ice scraper for years. The new machine and its trailer work rapidly, cleaning and scraping the ice in one operation.



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New Electric Motor, with Special Nonslipping Tires at the Rear and on the Left Front Wheel, Drawing a Scraper in an Ice-Skating Rink

AMERICAN HEROES AND STATESMEN HONORED IN NAMING TRAINING CAMPS

By HIRAM GRANT

SEVERAL hundred thousand American boys in khaki are being given intensive training for service overseas at newly established camps and cantonments situated in various states throughout the country. These places have been given the names of American men who have distinguished themselves in the service of their country. It is therefore fitting at this time of national sacrifice that the deeds of some of those who have given their energies, and in certain cases their lives, for the protection and development of the United States, should be remembered by patriotic citizens and soldiers alike.

There are 16 national-army cantonments and a similar number of national-guard camps.

Camp Devens, at Ayer, Mass., has the selected men of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It is named in honor of Brigadier General Charles Devens who at the end of the Civil War was made a brevet major general in recognition of his campaign before Richmond. He served at one time as attorney-general.

Camp Upton, Yaphank, Long Island, N. Y., has the drafted troops from the metropolitan portion of New York. It is named for Major General Emery Upton, U. S. V., 1864, who distinguished himself gallantly at the battle of Winchester. Many of the recommendations made in his work, "The Military Policy of the United States," were put in effect by congress last year.

Camp Dix, located at Wrightstown, N. J., holds national-army men from northern Pennsylvania and that part of New York outside of the metropolitan area. It bears the name of Major General John Adams Dix, U. S. V., who as secretary of the treasury during President Buchanan's administration ordered that any man should be shot who lowered the flag. He served as United States senator from New York, as minister to France, 1866-69, and subsequently as governor of New York State.

Camp Meade, Annapolis Junction, Md., is the cantonment of selected men from southern Pennsylvania. Major General George G. Meade, U. S. A., for whom the camp is named, served in both the Mexican and Civil wars and received the thanks of congress for his work at Gettysburg when commanding the Army of the Potomac.

Camp Lee, Petersburg, Va., has the national-army men of New Jersey, Virginia, Maryland, Delaware, and the District of Columbia. It is a monument to Robert E. Lee, general in chief of the Confederate army, whose last campaign was near Petersburg, where the present camp is situated.

Camp Jackson at Columbia, S. C., is the training place of all the drafted men that the states of Tennessee and North and South Carolina have supplied for the defense of democracy and justice. It honors the name of Major General Andrew Jackson, who served against the Creek Indians, distinguished himself at New Orleans in 1815, and served as president for two terms.

Camp Gordon, at Atlanta, holds the selected men of Georgia, Alabama, and Florida. It bears the name of Lieutenant General J. B. Gordon, C. S. A., who was born in the state, fought valiantly for the cause that he thought to be right, and at different times served as United States senator and governor.

Camp Sherman, Chillicothe, Ohio, is filled with honor men from Ohio and West Virginia. General W. T. Sherman, U. S. A., as commander in chief of the U. S. Army, 1869-83, requires no introduction.

Camp Zachary Taylor, Louisville, Ky., has men from Indiana and Kentucky, and when first established was known as Camp Taylor. Its present name, like the original one, honors the memory of Major General Zachary Taylor, U. S. A., who after distinguished service in Mexico was made president.

Camp Custer is at Battle Creek, Mich., and is the national-army training point for men from that state and Wisconsin. Major General George A. Custer commanded the Michigan brigade in the Civil War and later was killed in action while leading the Seventh Cavalry at Little Big Horn, Mont., 1876.

Camp Grant, at Rockford, Ill., has Illinois' drafted troops and some from Wisconsin. General U. S. Grant, commander in chief of the Union forces during the Rebellion and for two terms president, honors it with his name.

Camp Pike, Little Rock, Ark., holds the drafted men of Arkansas, Louisiana, and Mississippi. Brigadier General Z. M. Pike, who first climbed Pike's Peak, was killed in action during the attack on York, Canada, in 1813.

Camp Dodge, Des Moines, Iowa, is the headquarters of the national-army men from Minnesota, Iowa, Nebraska, and North and South Dakota. Major General Grenville M. Dodge commanded the Iowa volunteers during the Rebellion and was the chief engineer and superintendent of construction for the Union Pacific Railway.

Camp Funston, Fort Riley, Kans., has the selected men of Kansas, Missouri, and Colorado. Major General Frederick Funston, the captor of Aguinaldo and hero of the Philippine insurrection, died last year while

commanding our troops at the Mexican border.

Camp Travis, at Fort Sam Houston, Texas, cares for the drafted men of Texas, Arizona, New Mexico, and Oklahoma. Lieutenant Colonel W. B. Travis will be recalled as the defender of the Alamo in 1836.

Camp Lewis, American Lake, Wash., holds the national-army men of that state, Oregon, California, Nevada, Utah, Idaho, Montana, and Wyoming. Captain Meriwether Lewis, U. S. A., headed the historical Lewis and Clarke Expedition to the mouth of the Columbia River in 1804.

The Camps of the National Guard

Many thousand of our national guardsmen are now with Pershing in France. For military reasons it is best here to ignore recent troop movements. The locations of these forces are therefore given without reference to the various changes that have taken place from time to time.

Camp Greene, Charlotte, N. C., is the seasoning place of soldiers from Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. Major General Nathanael Greene of the Continental Army received the thanks of congress in 1781 for his campaign in South Carolina.

Camp Wadsworth, Spartanburg, S. C., has the guardsmen of New York. It is named for Brigadier General J. S. Wadsworth, who was brevetted major general. He was military governor of Washington in 1862 and commander of a division at Fredericksburg and Gettysburg. While leading a corps he was killed during the campaign of the Wilderness.

Camp Hancock, Augusta, Ga., quarters Pennsylvania's men. Major General Winfield Scott Hancock, U. S. A., served in the Mexican and Civil wars, distinguished himself at Gettysburg and Spottsylvania, and was nominated for the presidency in 1880.

Camp McClellan, Anniston, Ala., serves national-guard troops from New Jersey, Virginia, Maryland, Delaware, and the District of Columbia. Major General G. B. McClellan, U. S. A., was commander in chief of the Northern forces 1861-62. He received the nomination for the presidency and later was made governor of New Jersey.

Camp Sevier, Greenville, S. C., holds the contingents from Tennessee, North Carolina, and South Carolina. Colonel John Sevier, North Carolina militia, became brigadier general, U. S. A., and did gallant work in the battle of King's Mountain, N. C., 1780. He was a member of congress from that state and subsequently governor of Tennessee.

Camp Wheeler, Macon, Ga., has troops from Georgia, Alabama, and Florida. Lieutenant General Joseph Wheeler, C. S. A., was major general, U. S. V., Spanish-American War, brigadier general, U. S. V., Philippine insurrection, and brigadier general, U. S. A., until his death.

Camp MacArthur, Waco, Texas, is the headquarters for Michigan and Wisconsin soldiers. Lieutenant General Arthur MacArthur, U. S. A., commanded Wisconsin troops during the Civil War, was engaged in the battle of Manila, and led troops during the Philippine insurrection.

Camp Logan, Houston, Texas, has Illinois' guardsmen. Major General John A. Logan served in the Mexican War and was a United States senator from Illinois on two different occasions.

Camp Cody, Deming, N. M., holds men from Minnesota, Iowa, Nebraska, North Dakota, and South Dakota. It bears the name of William F. ("Buffalo Bill") Cody, who was chief of scouts with the U. S. Army, 1868-72, and with the troops at Wounded Knee.

Camp Doniphan, Fort Sill, Okla., has Missouri and Kansas guards. Colonel A. W. Doniphan, First Missouri Cavalry, commanded the expedition to Chihuahua during the Mexican War.

Camp Bowie, Fort Worth, Texas, harbors Oklahoma and Texas troops. James Bowie, known well for the bowie knife, figured prominently in the revolution of Texas against Mexico, at which time he was a colonel. He fell while bravely defending the Alamo.

Camp Sheridan, Montgomery, Ala., holds Ohio and West Virginia national-guard forces. General P. H. Sheridan, U. S. A., distinguished himself particularly during the campaign in Shenandoah Valley. He commanded at Five Forks, was present at Appomattox Court House, and became commander in chief of the army in 1883.

Camp Shelby, Hattiesburg, Miss., has Indiana and Kentucky soldiers. It bears the name of Colonel Isaac Shelby, Virginia militia, who gained attention at King's Mountain and distinguished himself in the campaign of South Carolina, 1781. After being the first governor of Kentucky, he won at the battle of the Thames, 1813.

Camp Beauregard, Alexandria, La., serves Louisiana, Mississippi, and Arkansas troops. It honors the name of General P. G. T. Beauregard, C. S. A., who in the Mexican War with the United States forces, and in the Civil War with the Confederate troops, won distinction.

Camp Kearny, Linda Vista, Calif., is headquarters for California, Nevada, Utah, Colorado, Arizona, and New Mexico guards. Brigadier General S. W. Kearny, U. S. A., during the Mexican War commanded the expedition to California and gained control of much of the territory that now forms the state.

Camp Fremont, Palo Alto, Calif., quarters guardsmen from Washington, Oregon, Montana, Idaho, and Wyoming. It carries the name of Major General J. C. Fremont, U. S. A., who explored the West in 1842-49 and became generally known as the "Pathfinder." After serving as United States senator from California he was nominated president. Subsequently he was Federal commander of the western department, leader at Cross Keys, and governor of Arizona.

WAR MAKES SILVER COINS MORE VALUABLE

New interest in the question of the coinage of silver—particularly Mexican silver—has developed as a result of the disturbed economic conditions in many parts of the world. Large amounts of gold have been withdrawn from circulation, creating a greater demand for silver for coinage, but at the same time the output of this metal in Mexico and other countries has been much below normal. Marked changes in values have resulted. It is in Mexico, perhaps, that the effects of these unusual conditions have been most manifest. The value of the Mexican silver dollar, for years about 50 cents, recently rose far above that figure. One eastern concern dealing in bullion is reported to have $50,000 in Mexican silver coin stored away, which is to be converted into bullion. A condition somewhat similar to Mexico's obtains in the Philippines, where the peso is said to be worth more than its face value.

HUNTERS BAG PHEASANTS FOR FOOD AND PLUMAGE

Thousands of Chinese pheasants were killed by hunters in the Pacific coast region during the open season last fall. In addition to being delectable food, the male birds are especially valuable because of their gorgeous coloring and long tail feathers which are much sought for millinery purposes. Collar and muff sets are also made to match hats trimmed with the varicolored plumage. Once rare in America, the birds are becoming plentiful in some sections.

Chinese Pheasants. Such as the One Above, Have Gorgeous Plumage That Is Valuable for Millinery Purposes

DISMANTLE BLAST FURNACE FOR LONG SHIPMENT

At an estimated cost of $50,000 or more for freight charges, a large secondhand blast furnace and its appurtenances are to be shipped from Bristol, Va., to the southernmost part of California for reinstallation. The dismantling is now in progress. The plant, which has been in operation for more than 10 years, was purchased by a Pacific-coast company because war conditions interfered with the acquisition of a new one.

Men at the Top of the Stack are Beginning the Wrecking Operations

VAST INCREASE IN FRENCH WATER-POWER OUTPUT

A surprising development of electric-generating companies has taken place in France because of war demands and the shortage of coal. Formerly in the Alpine and Pyrenean districts, out of a total of 1,173 plants, only seven developed more than 10,000 hp. But during 1915 and 1916 the total capacity of the establishments increased to 5,000,000 hp., with several plants producing more than 40,000 hp., and one reaching 250,000 horsepower.

¶ A Swedish concern, seeking to overcome the shortage of raw materials for soap making, has undertaken the manufacture of soap from sewer fat, by a new method, and proposes also to use native vegetable fats from beech mast, horse-chestnuts, and the like.

WINDOW DISPLAY DEPICTS DEATH IN GARBAGE CAN

A gruesome but attention-compelling display was recently placed in a gas company's show window to advertise

An Electrically Operated Window Display, Employed to Advertise a Garbage Incinerator, Showing Death, with Glaring Red Eyes and Menacing Clawlike Hands, Alternately Emerging from and Retiring into a Garbage Can

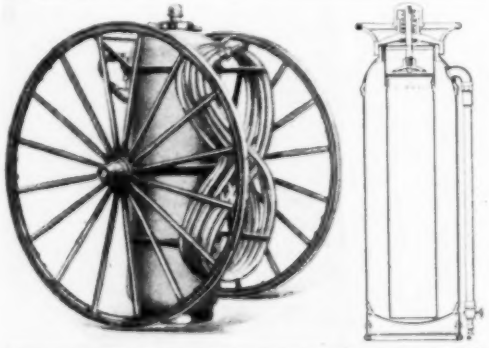
the superiority of a gas-fired incinerator over the garbage can, for refuse disposal. "Disease Lurks in the Garbage Can" was the legend prominently displayed above a battered receptacle whose lid was slowly opened and closed by a hidden electrical mechanism. As the cover tilted back there emerged—seemingly pushing its own way out—a figure of Death, draped in black. A human skull with red-glass eyes, electrically lighted from within, served as the head. Clawlike hands stretched forth menacingly as the figure rose, and then they withdrew as it settled back into the container.

DRASTIC ACTION NEEDED TO COMBAT DRY ROT

Precautions as strict as those observed by surgeons to prevent infection have recently been recommended by British engineers as essential to thorough eradication of dry rot in timber. The infected wood, it is said, should be oiled, to keep down the spores, and carefully removed and burned. Workmen are especially warned against placing the diseased wood in lumberyards, and carpenters are advised to sterilize the tools, particularly the saws, used in cutting away the infected parts.

FOAM FIRE EXTINGUISHER HAS SEALED INNER TUBE

Foam fire extinguishers with hermetically sealed inner containers that prevent the chemicals from slopping and thereby prematurely discharging, have been introduced in a number of forms. They are supplied with spring-seated plungers which, when struck sharply, break the seals and allow the liquids to unite. To operate the 3-gal. portable size, the tank is inverted and the plunger struck against the floor. A 10-ft. stream of foam, containing carbonic acid bubbles that smother any kind of fire, flows instantly. A larger extinguisher, mounted on wheels and intended for factory use, has a 40-gal. capacity and is set in action by hitting the plunger with some heavy object and reversing the position of the tank.



The Inside Arrangement of the Factory Model Is the Same as That of the Hand Extinguisher Explained by the Diagram at the Right

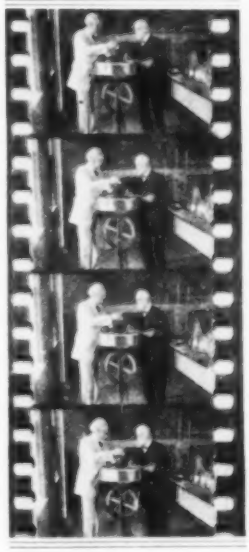
Since the inner compartment is closed, the extinguisher is particularly suited for use on ships and railway trains.

¶To quiet fears roused by vicious rumors, our government has officially denied that bank deposits are to be confiscated.

FAMOUS SCIENTIST TAKES ROLE IN DAIRY MOVIE

The Original Centrifugal Machine is Shown in This Film

A notable chapter in the history of modern dairying has recently been dramatized for the movies and will be shown on the screen at scores of farmers' institutes in Wisconsin this winter. Certain of the scenes in the film show the research which resulted in the development of the Babcock test, now known the world over as a simple means of ascertaining the amount of butter fat in milk. The producers have made the film unusually realistic by inducing Dr. Stephen M. Babcock, originator of the test, to appear in a leading rôle, while the very room, in Madison, Wis., in which the professor carried on his experiments has been used as a setting. The original centrifugal machine which he employed in his work is also shown in the film, a portion of which is reproduced herewith.



Section of Movie Film Depicting History of the Babcock Test

DANCING PAVILION ERECTED IN LAKE TO DODGE LAW

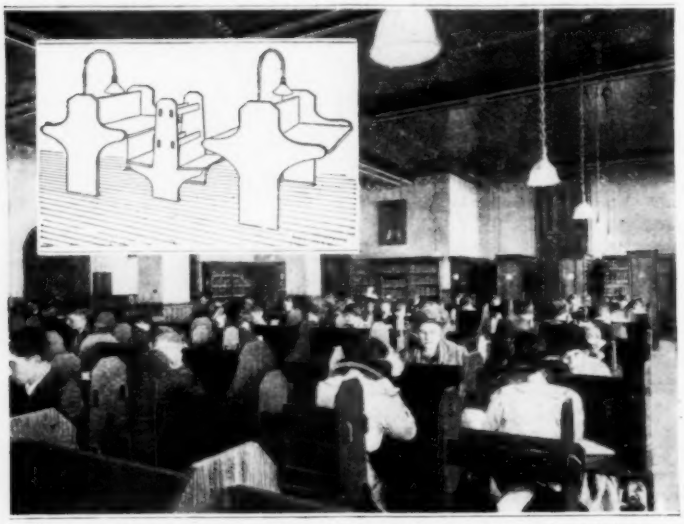
When the gayeties of a park in South Sioux City, Neb., were jeopardized at the height of the season by the enactment of an ordinance prohibiting Sunday evening dancing, a pavilion was established some 20 or 30 ft. outside the corporate limits of the municipality. The resort is situated on the bank of a small lake, the shore of which is one of the boundary lines of the town. Within twelve hours after the council took its action, carpenters were at work constructing a new dancing pavilion on concrete piers placed in the shallow water close to the shore. By the end of the week the structure was completed and on Sunday night the usual crowd of pleasure seekers danced without interruption.

Twelve Hours After the Local Ordinance was Enacted, Carpenters Were at Work Erecting a New Pavilion in the Lake

When Sunday Came with Its Crowds of Pleasure Seekers, the Water-Bound Pavilion Was Ready for Dancers

EFFICIENT SEATING PLAN FOR COLLEGE LIBRARY

Individual desks and benches, designed for preserving discipline without interfering with work, are being used in the libraries of a university and college in two western states. They have been found more satisfactory than the usual tables and chairs, for they separate the students and conserve space by preventing two or three persons from occupying footage intended for twice their number.



The Inset Explains the Design of the Desks and Benches, While the Photograph Shows Them in Use in a Large Library Room Frequented by Many Students

SOLDIERS PICK COTTON IN THE SOUTH

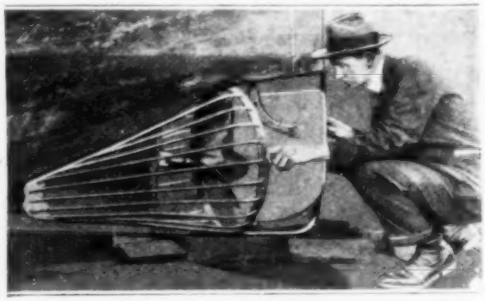
The varied and unusual demands which are made on the ability of our new soldiers finds illustration in a job of cotton picking which was assigned to a group of men in Camp Gordon, at Atlanta, Ga. A part of the agricultural land at this point appropriated for army use included a field of cotton that was ready to be picked soon after the soldiers arrived. Rather than let this product—doubly valuable in war time—go to waste, the men in khaki were set to gathering the white tufts and were permitted to devote the proceeds to their mess fund.

FRENCH USE ANTISEPTIC POWDER AS FIRST AID

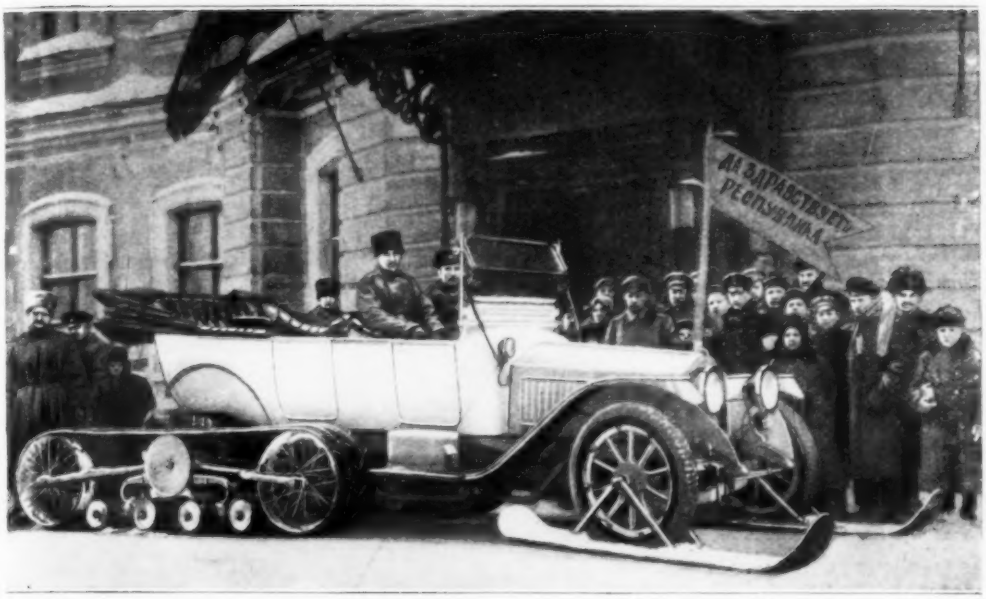
Soldiers in the French army are each being provided with a small first-aid vial containing an antiseptic powder and a glass tube for blowing the preparation into wounds as soon as possible after they have been inflicted. This antiseptic is composed of chloride of lime, mixed with boracic acid, and is practically the same as the famous antiseptic fluid used by Dr. Carrel in "irrigating" wounds. The powdered material is best suited to first-aid needs, for it occupies little space in the soldier's already heavy outfit and it is easily applied. Its application gives no pain, even if the nerves are exposed, only a feeling of warmth being produced. As the powder dissolves slowly, the antiseptic action continues for several hours.

SHIELDS PROTECT NETS FROM BOAT PROPELLERS

Because of the great number of salmon nets spread in the Columbia River and in the sea near its mouth, boats plying those waters are provided with propeller and rudder shields. These enable the boats to run over a net without becoming entangled.



The Propeller and Rudder Shield Enables a Boat to Run over a Fishing Net without Entangling



Powerful Automobile, Equipped for Service in the Snow, Which Was Once the Property of the Former Czar and Is Now in Possession of the Russian Revolutionists

REVOLUTIONISTS ENJOYING EX-CZAR'S AUTO SLED

The Russian revolutionists are utilizing many of the possessions of the Romanoffs, including the former czar's winter touring car. This big automobile is in reality a motorized sled, runners having been mounted beneath the front wheels, while power is supplied to broad endless belts at the rear, which run on pairs of chain-driven wheels.

SCUM FROM SUGAR BEETS USED TO MAKE CEMENT

A by-product is obtained in the manufacture of beet sugar from which cement can be made, according to a Paris report. In boiling beets to make the sugar, there collects a thick scum which has been found to contain considerable carbonate of lime. The amount of calcium carbonate which can be obtained from 100,000 tons of beets is about 6,000 tons. When sufficient clay is added and the substance burned, a high grade of cement is obtained.

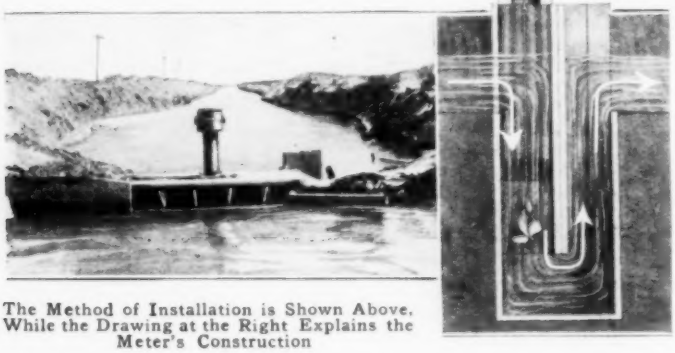
SANE WINTER SPORT TOGS FOR OUTDOOR GIRL

Winter sports such as skiing, skating, and tobogganing, call for clothing that affords perfect freedom of movement in addition to warmth. These points, vitally needed if the full benefits of exercise are to be gained, are found in a common-sense though radical costume that has been created for the American outdoor girl. It consists of a jaunty fur-lined leather jacket and wool-khaki breeches, which are worn with knee-height boots.

¶ A cake, 4 ft. in diameter, 1 ft. high, and weighing 360 lb., was sent from New York to Paris to be served at a Y. M. C. A. Christmas dinner for 2,400 soldiers and sailors.

WATER METER IS DESIGNED FOR IRRIGATION DITCHES

For measuring water taken from ditches by consumers for irrigating purposes, a meter, governed by the flow through a channel of definite area, has been introduced. It consists in part of a boxlike trap so installed in a canal that all the water passes through it, as if it were the spillway of a dam. Extending to within a foot of the bottom there is a dividing wall which separates the interior into two connected chambers. The intake compartment is built with converging sides and fitted with diaphragms that prevent the formation of eddies as the water passes into a perpendicular throat where a spiral vane is suspended. The speed of the latter depends upon the flow of the water. It is connected by a rod with the recording mechanism in a metal housing on top of the box. The volume is mechanically calculated and indicated in proper terms on a dial. When the water leaves the throat, it passes beneath the dividing wall, rises in the downstream chamber, and is discharged. It is said that sand capable of passing a 10-mesh screen will be carried through the trap.



The Method of Installation is Shown Above, While the Drawing at the Right Explains the Meter's Construction

SANDPAPER BAND DESIGNED FOR POISON BOTTLE

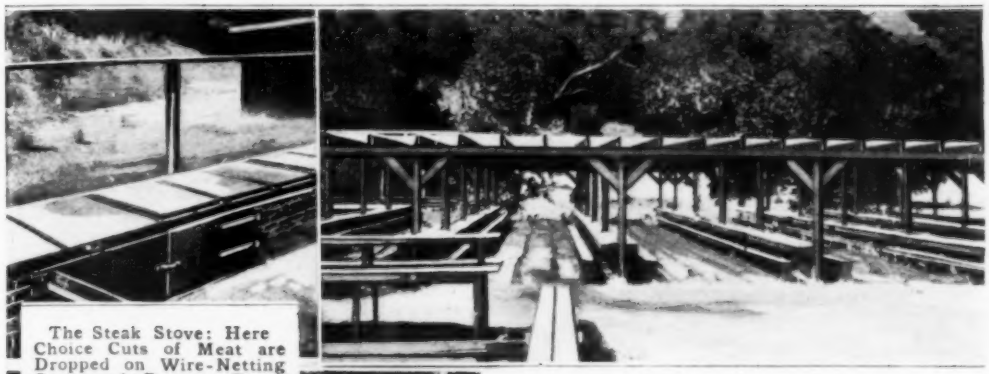
For bottles containing poison, a sandpaper guard has been introduced which, when applied, enables a person to distinguish such a receptacle in the dark. The paper is provided with a rectangular opening so that the label is surrounded, but not covered. A gummed tab permits the device to be quickly and securely attached.

ARMY-CAMP BUILDERS FEED MEN A LA CAFETERIA

The popularity of the cafeteria has spread to the army camps, a contracting firm for an army cantonment in the East having introduced the self-service method in feeding its men, thereby eliminating camp "flunkies." The employes, moving in long rows, filled their trays at serving tables and then, after paying at the cashier's desk, moved on to their seats. The new arrangement made it possible to feed 2,500 men without confusion.

CART AND MEASURING PUMP FOR SHIPPING BARRELS

For automatically measuring and delivering gasoline, kerosene, and oils, a serviceable barrel cart and a registering pump have been produced. The equipment is particularly intended for garages and service stations, and enables the contents of any wooden or metal shipping cask to be dispensed readily. A dial records each crank revolution. A barrel is held securely in place on the cart cradle by means of a grip chain that passes around the middle part of it.



The Steak Stove: Here Choice Cuts of Meat are Dropped on Wire-Netting Grates and "Done to a Turn"

The Dining Area: Beneath This Extensive Pergola Are Picnic Benches and Tables to Accommodate 1,500 Persons

The Big Furnace on Which Coffee, Soup, and Other Items on the Barbecue Menus are Prepared

RANCH EQUIPPED TO GIVE BIG BARBECUES

Abundant evidence of the hospitality of a western ranch owner is found in the extensive barbecue equipment which he has installed on his property for the purpose of entertaining his friends by the thousand. Huge roasting pits, a long outdoor stove and furnace, and a dining pavilion constitute the main features of the rancher's recreation grounds, located in a wooded cañon. The sections of beef to be roasted are placed in two deep pits in which bonfires, covered with stones, have been built. After the meat is in place the pits are sealed so that the flavor may be retained.

The furnace is a tunnellike structure of brick, just above the ground, from which rise several flues that connect with a smokestack. Here coffee, soups, beans, etc., are prepared. The stove resembles the furnace, but is without the various flues. Wire-netting covering is provided on which the steaks are broiled. Located beneath a vast pergola not far from the cooking area are picnic tables and benches which will accommodate 1,500 persons. Near by are convenient tables for carving and serving.

PATRONS HELP IN MOVING PUBLIC-LIBRARY BOOKS

When the time came to move the Indianapolis public library to a new building not long since, a plan was followed that materially reduced the expense of the undertaking by having the public share in the work. Notices were posted conspicuously inviting all patrons to take home four, six, or more volumes, instead of one, with the understanding that they be returned to the new quarters. In response to this suggestion a large number of books were transferred without cost.

Notices Posted at the Indianapolis Public Library Inviting Patrons to Share in Moving the Volumes by Drawing Several at a Time and Returning Them to the New Building

By the Hébert Method, Soldiers Acquire Great Skill with the Bayonet. Here a Squad of Men Suffering from Trench Fatigue Is Ready for a Work-Out

DRILLS MAKE POILU WORTH TWO HUNS

THROUGH the application of a radical system of exercise, amazing results have been attained in conditioning French soldiers after their devitalizing periods at the front.

It has been found that trench fatigue is more of a mental than physical exhaustion. Heretofore attempts have been made to counteract it by giving the men the rest cure; that is, fighters have been transported to quiet camps in the rear to spend several days in idleness and sleep. Strained nerves, however, prevent normal, restful slumber. Therefore only partial recovery has been made.

To meet the condition, the army authorities have tried out, with splendid success, a plan of regeneration devised by Lieutenant Hébert of the French navy. Instead of allowing worn-out French soldiers to fall into their cots and sleep when they first emerge from the shell craters and trenches, they are taken into the country. There in open fields and woodlands they are put through training that affords mental relaxation and physical exertion, after which they have untroubled, energy-giving slumber.

Stripped to their waists, the fellows are made to run across fields, leap ditches, hurdle fences, race up hillsides,

PHOTOGRAPHS BY

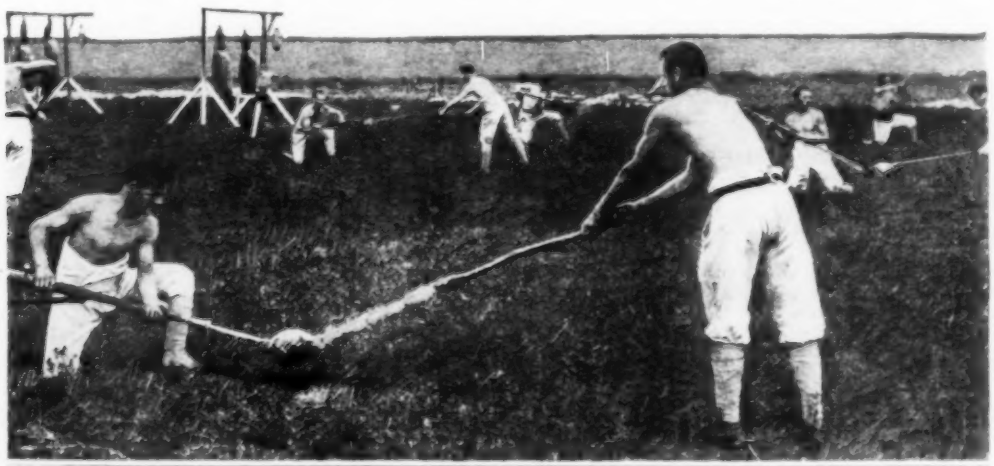
Hurdling Fences, Clambering over Walls and Sandbag Parapets, Racing through Fields, Dashing Uphill and Down, the Men Exercise Their Muscles and Relax Their Brains so That When Sleep Comes It Is Sound

Crawling Like Snakes in the Grass: A Drill That Not Only Brings the Muscles into Play, but Also Teaches the Men to Be Crafty and Agile in "No Man's Land," Where the Less One is Seen the Better

dart along forest paths, climb trees like gorillas, crawl through grass like snakes, jump, and laugh, and sing, and, in short, act the part of the fauns that the startled peasants at first think them to be. Each period of violent exercise is followed by a measured spell of quiet movements, all of which is planned and executed with the utmost care. When subsequently given an opportunity to rest, the men have undisturbed, sound slumber that refreshes them.

After a Man has Turned Frog for a While, the Blood Races through His Body and Perspiration Opens the Pores of the Skin

The same method is used for training new men for military service. The former system is entirely eliminated and the soldiers are taught only movements that will be of actual value to them in battle. They are tutored in throwing grenades with



PICTORIAL PRESS

Bayonet Work Today Amounts to Snappy, Fast Fencing. The Nimbler Fighter Disposes of His Antagonist. This Shows How French Soldiers Learn Their Lightninglike Parries and Thrusts

the utmost accuracy. They are made masters of the bayonet. Their muscles harden like steel, their exposed skin becomes tough and leatherish.

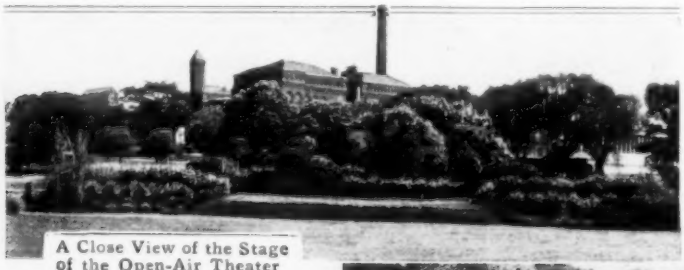
As an example of the benefits of such training, troops drilled by this system were pitted in sham battle against a body of similar size developed by the old method. Their losses were four "dead" and a few "wounded" against their opponents' 300 "dead."

EXHAUSTIVE TESTS SHOW STRENGH OF WOODS

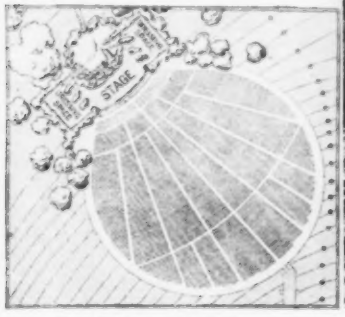
Numerous important questions regarding the properties of woods of various kinds have been answered in a bulletin lately issued by the Department of Agriculture. As a result of about 130,000 tests, the government's investigators were able to determine for many different kinds of woods the exact relationships between specific gravity and strength, and between strength and the moisture content. The tables given should be of great value in all forms of construction where the reliance to be placed on wooden parts must be known exactly. A case in point is the building of aeroplanes which require great strength, coupled with a minimum of weight. The information given also includes the selection of proper substitutes for woods which have become difficult to obtain.

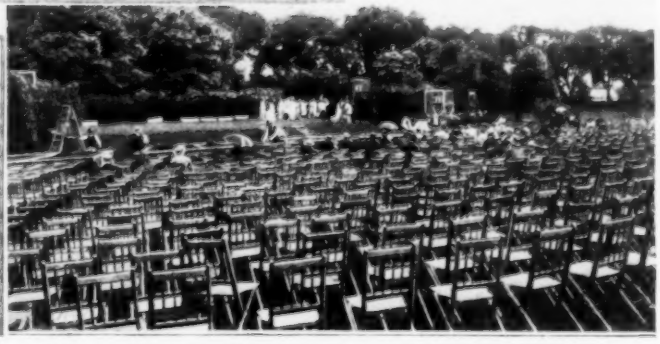
NATIONAL OUTDOOR THEATER ESTABLISHED AT CAPITAL

As a result of the efforts of a prominent patron of the drama, an open-air theater, known as the National Sylvan Theater, has been established by the government at the capital, on the grounds between the Washington Monument and the Potomac River. The stage, which is of generous proportions, is situated on a low embankment and bordered on three sides by luxurious shrubbery, in the midst of which the dressing areas are provided. At intervals between scenes and acts the stage is screened from the audience by jets of steam released from concealed pipes. The natural amphitheater is nearly circular in form and offers adequate space for about 8,000 folding chairs. The opening production, held during the warm months some time ago, was a three-part masque entitled "The Drama Triumphant," a classic play written especially for the occasion and witnessed by approximately 10,000 persons.



A Close View of the Stage of the Open-Air Theater





The Diagram Shows Arrangement of Stage and Amphitheater of the National Sylvan Theater at Washington. Right: Rehearsal Showing Small Section of Amphitheater

HISTORIC CENTURY PLANT BLOOMS AT LAST

For people in the greater portion of the United States the blossoming of a century plant is an event so unusual as to attract especial attention, but in the case of the century plant in the Washington, D. C., Botanical Gardens which bloomed recently, even greater interest was aroused because the seed from which this plant grew was taken from one that bloomed 105 years ago, or two years before the British captured the national capital. Since the slender spike of flowers appeared on a stalk some 12 ft. high, the plant has given no signs of dying, though botanists have found that death usually follows the production of the blossom.

UMBRELLA REPAIRMAN HAS TRAVELING SHOP

By converting a tricycle into a portable workshop a man who earns his living by repairing umbrellas and doing miscellaneous mechanical jobs finds himself able to secure more work because he can cover a greater territory. The front of the odd vehicle is provided with shelves, drawers, and other receptacles, which are fully stocked with all necessary tools and supplies for repair work.

This Man's Workshop Serves Him Equally Well for Purposes of Locomotion

NAVY'S FIRST HONOR MEDAL GOES TO OHIO SAILOR

To Patrick McGunigal, Youngstown, Ohio, ship's fitter, first class, U. S. N., falls the distinction of receiving the

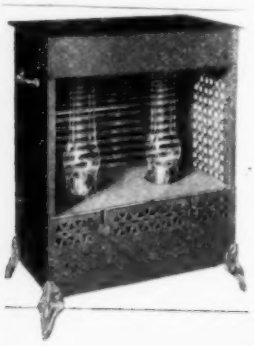
Leaping to the Ropes, the Sailor Climbed to the Helpless Observer and Rescued Him from His Precarious Position

first medal of honor issued by the Navy Department during the present war. He is cited in the Official Bulletin for making "a rescue at sea involving extraordinary heroism." A kite balloon sent up from one of our cruisers in the war zone was caught in a squall while at an altitude of 400 ft. The basket was whipped and twisted until the observer became hopelessly entangled in the ropes and was unable to free himself. After some difficulty the big bag was hauled in to the ship's side, but the carriage trailed in the water and submerged its imprisoned occupant. McGunigal, who has been in the service about thirteen years, climbed down the ship's side, leaped to the ropes extending to the basket, and at the risk of his life cleared the tangle, put a bowline around the observer, and ordered him

pulled on deck. His own rescue was subsequently effected. In addition to the medal, he was presented with a gratuity of one hundred dollars.

ROOMS HEATED AND LIGHTED BY SMALL OIL STOVE

Oil heating stoves, suited particularly for warming rooms on damp, chilly days and evenings in the spring and fall when the furnace is not in operation, are being provided with circular burners and glass chimneys backed by corrugated copper reflectors. The latter, in addition to throwing heat into a room, reflect enough light for reading purposes.



HORIZONTAL-BLADED MOWER CUTS NEGLECTED LAWNS

A lawn mower having horizontal knives that will cut grass or weeds, regardless of length, has been developed. A completely denuded path is secured with one operation. The position of the cutting members permits the cutting of a lawn flush with trees or other obstructions. All stems and grass are thrown to the rear of the knives, where a basket may be attached.

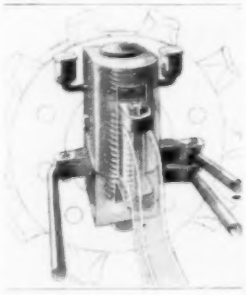
¶Piping of compressed cellulose is now being used abroad instead of metal pipes, according to reports. While satisfactory for hot and cold air and corrosive acids, it is not suitable for steam.

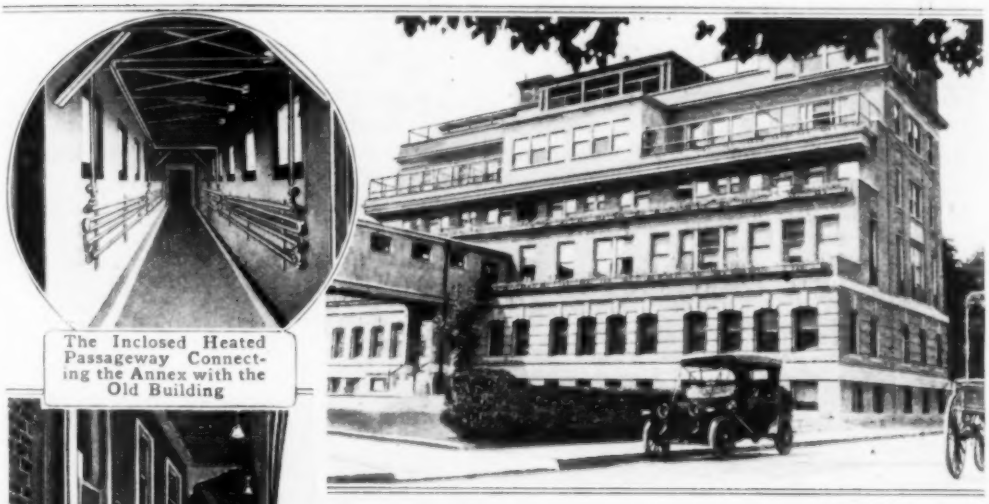
LONG FLIGHT OF WARPLANE MADE IN RECORD TIME

What possibly is a new cross-country aerial record was recently made when a British bombing plane was driven from England to a base in the Mediterranean, a distance of about 2,000 miles, in 31 hours of actual flight. The trip was undertaken in order to execute an attack in the vicinity of Constantinople. Six men were carried, and the distance was covered in a series of eight flights. Rainstorms and strong winds were encountered part of the time. One stretch of the trip consisted of a 200-mile drive over mountainous country where safe landing was impossible.

SHOCK ABSORBER COMBINED WITH STEERING KNUCKLE

A combined steering knuckle and shock absorber is a recent refinement in the construction of automobile parts, which is designed to lessen the strain on the front axle and to render the engine less subject to jar. The outer portion, or case, of the knuckle consists of a cylinder cast integral with the stub on which the wheel is mounted. Two rods connect the two front-wheel knuckles, thereby giving double assurance that the front wheels will act in unison. Within each of the knuckle cases, which stand in a vertical position, are two sets of coil springs, one above and one below a sliding block that extends through a slot in the side of the case and is hinged to the axle by a pintle bolt. The springs permit up-and-down play of the block in the knuckle case and so materially lessen the jar transmitted to the axle.





The Inclosed Heated Passageway Connecting the Annex with the Old Building

General View of the New Union Hospital Annex at Fall River, Massachusetts, Showing the Receding Front Which Makes Possible Broad, Uncovered Balconies on Four Floors

One of the Balconies Extending the Full Length of the Building and Accessible from All Adjoining Rooms

NEW HOSPITAL EMBODIES MODERN IDEAS

A five-story structure, in which many of the most modern ideas in hospital construction have been embodied, is the recently completed annex to the Union Hospital in Fall River, Mass. A feature that instantly attracts attention is the manner in which each of the stories above the first recedes from the front more than the one beneath it, thereby providing space for broad, uncovered balconies that extend the full length of the building and are accessible from all adjoining rooms. Rows of flower boxes add much to the attractiveness of these rest places. On a level with the second floor is an inclosed, heated passageway connecting the annex with the old building. In the basement of the new structure are the heating plant and an ice plant. The offices and operating rooms are on the main floor, dormitories on the second floor, private rooms on the third, and children's quarters on the fourth floor.

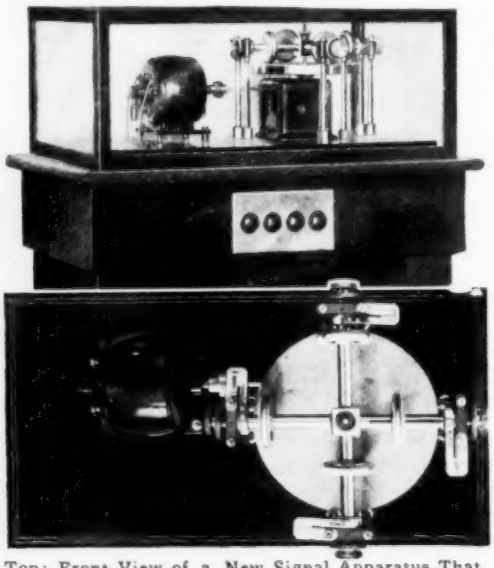
CITY'S FISH MARKET DRAWS LARGE RETAIL PATRONAGE

By the inauguration of a municipal fish market where retail orders are filled at wholesale prices, he meat-conservation movement has been furthered at Portland, Ore. A large variety of fish, including many kinds that are but little known to the average consumer, has been offered. The results have been heavy patronage and a general reduction of prices throughout the city. The scheme was "put across" by local advertising men.

Patrons Crowding Portland's Fish Market to Take Advantage of Cost Prices

ELECTRIC-SIGNAL DEVICE FOR ELEVATORS

An electrically operated signal for elevators now being installed in office buildings, times the starting of cars



Top: Front View of a New Signal Apparatus That is Equally Well Adapted to Signaling Elevator Operators and Timing Artillery Fire. Bottom: View from Above, Showing the Friction Disk and Wheels

with absolute accuracy, thus preventing the overloading of the power plant by accidental irregularities of service. Furthermore, it leaves the head elevator man free for additional duties. Because of its accuracy and adjustability the mechanism is also adapted for use in timing artillery fire. The device is provided with a small motor which drives a horizontal friction disk. Mounted above the latter, on four radiating axles, are four friction wheels that can be set for any desired relative speed by placing them at various distances from the center. The turning of each wheel and its axle revolves a cam on which a sliding brush contact plays. With each revolution the contact is broken, causing a signal to be sounded in the elevator shafts.

¶ At certain points in Sweden's lumber district where there are sulphite factories, lubricating oils are now being made from liquid resin.

BASEMENT FREED OF SMOKE BY ELECTRIC FANS

To remove the smoke as quickly as possible from the basement of a city department store, after a small conflagration had been extinguished, a large battery of electric fans was recently used with success. The glass squares were removed from a section of the sidewalk in front of the building and fans laid on the grating to withdraw smoke driven to that point by some 40 other fans installed in the basement.

FRENCH TYPEWRITER DESKS MAKE USERS STAND UP

Officials in the French army do not believe that the most efficient service is obtained from members of the military clerical force when the latter sit at their desks practically all day without interruption. Accordingly the French government is said to have installed, for the use of army clerks, typewriter stands so made that each machine is alternately raised and lowered each half hour. Under this arrangement the most sedentary individuals are compelled to stand while doing a portion of each day's work. The innovation is reported to have proven very beneficial.

French Military Clerks are Here Shown at Desks, Each of Which Automatically Raises and Lowers Its Typewriter at Intervals

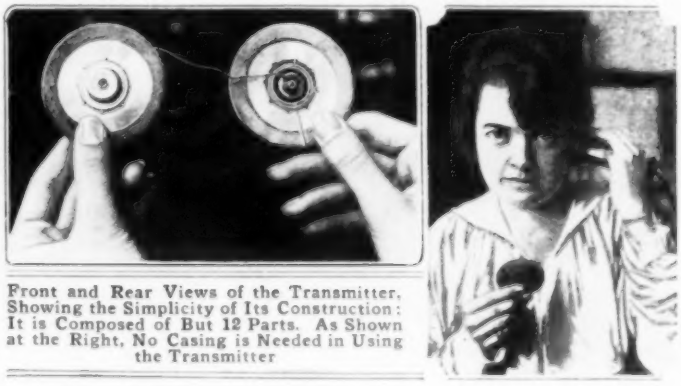
FALCONS MAY BE TRAINED TO DESTROY SUBMARINES

A unique method proposed for the destruction of submarines is that of a man who plans to train falcons to hunt for periscopes in identically the same manner that the birds have heretofore been used for hunting game. Falcons are trained to sight game by being fed from a cavity, usually in the head of a stuffed deer. In this way they are trained to fly at such game. For hunting U-boats, training would be accomplished by means of food placed in the ends of dummy periscopes so that the birds would fly at such an object whenever sighted. Tiny bombs of the highest explosive arranged to explode upon contact with water would be attached to the birds to effect the destruction of any periscope upon which they should alight. On shipboard the falcons would be starved and hooded until a submarine is sighted.

The Explosion of the Bomb Carried by the Falcon would be Sufficient to Wreck Any Periscope upon Which It might Alight

TELEPHONE TRANSMITTER OF SIMPLIFIED TYPE

A recent refinement in the manufacture of telephone instruments is a transmitter having a diaphragm to which is attached a small, disklike cup containing carbon granules that serve as a resistance medium, as in other transmitters. This cup has no support from other parts of the instrument, making possible a simpler construction and a saving of material by eliminating the heavy metal bridge ordinarily installed back of the diaphragm as a rigid support for a portion of the delicate apparatus. The new diaphragm, being complete in itself, can be talked "into" without installing it in a case, and in various tests has transmitted the voice over many miles of cable, with one cell of a dry battery at each end, the sounds being very clear.



Front and Rear Views of the Transmitter, Showing the Simplicity of Its Construction: It is Composed of But 12 Parts. As Shown at the Right, No Casing is Needed in Using the Transmitter

NOVEL STORM HOUSE BUILT ON SOUTHERN ISLAND

To provide protection against hurricanes and tidal waves, the owner of a small island in Barataria Bay, below New Orleans and near the Gulf, has built a securely anchored house and an even more firmly fixed elevated "storm cellar." Interest centers chiefly in the latter, which consists of a 12 by 12-ft. room, 24 ft. above tidewater. Large piles were driven to a depth of 35 ft., and on top of them a sill, built of heavy timbers, was bolted in place. The shelter is constructed of 2-in. planks and supported on inclined I-beams, secured to the sill and well braced. Ten 1¾-in. hogchains, fastened to piles driven on different sides, anchor the entire structure.

The Elevated "Storm Cellar" on Independence Island, Barataria Bay, Which is Built on Piles Driven to a Depth of 35 Feet, Supported on Inclined I-Beams, and Anchored by Hogchains

LINSEED-OIL SUBSTITUTE A RUBBER BY-PRODUCT

Considerable attention is being given by British interests in the Federated Malay States, and elsewhere, to the utilization of Para rubber seeds for commercial purposes. The kernels of these seeds have been found to contain about 42 per cent of a liquid drying oil, very similar in properties to linseed oil, and like that oil, capable of being used in the manufacture of paints, varnishes, rubber substitutes, oilcloth, soft soap, and other products. A problem which has not yet been wholly solved is how to reduce the cost of collecting and shelling the seeds, to make the extraction of the oil profitable.

Learning How to Crawl to the Edge of an Enemy's Trench with a Camouflaged Microphone

STUDENT SOLDIERS TRAINED IN USE OF DICTAGRAPH

In modern warfare the king of eavesdroppers, the dictagraph, plays an inconspicuous but highly important rôle. With microphone attachments it serves the sapper in a vital way. When properly concealed near the edge of an enemy trench and connected by wire with a receiving instrument,

One Man "Listens In" While the Other Records Whatever Information is Obtained

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In a Practice Trench Listening to the Underground Operations of the "Enemy" Sappers

it hears what might readily escape the human ear and often supplies valuable information from across "No Man's Land." Therefore picked men are carefully tutored in its operaton.

MEN ON FIRING LINE SEE SOUND WAVES

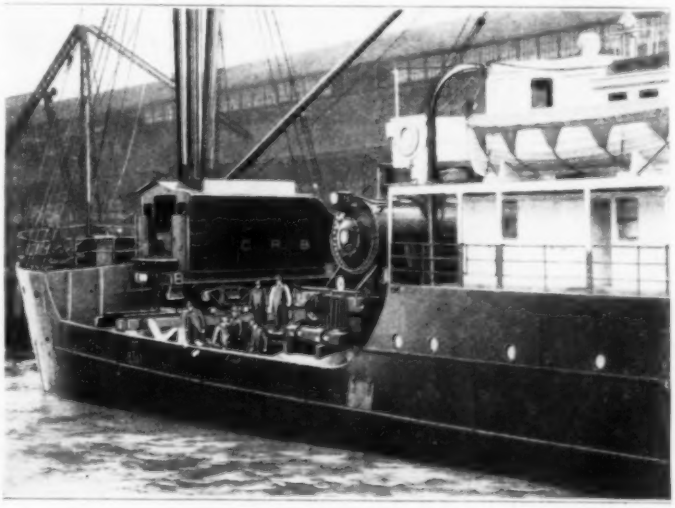
Interesting data regarding the visibility of sound waves have recently been published in "L'Astronomie," in letters from men at the front. One writer tells of seeing curved lines of light, alternating with dark bands, moving swiftly across the sky while heavy cannonading was in progress. A second writer speaks of witnessing a series of arcs of light traveling across a cloud-flecked sky. Scientists attribute these phenomena to sound waves which originate with the explosions and spread in all directions like enlarging spheres, resulting in successive and alternate belts of rarefied and compressed air. Under certain atmospheric conditions, with the sun in the proper position, portions of these spreading waves become visible in the form of moving arcs of light.

ENGLISH PLANTS GENERATE STEAM WITH REFUSE

A number of English manufacturing plants are having excellent results in utilizing refuse as fuel to produce steam, special burners being employed for the purpose. One textile mill obtains all the steam required to run its machinery by burning shoddy waste. By using some of the steam to provide a forced draft, the burning capacity of the refuse can often be increased 50 per cent. Where the amount is small it supplies fuel for a water heater.

RUN LOCOMOTIVE ONTO SHIP FOR TRANSPORTATION

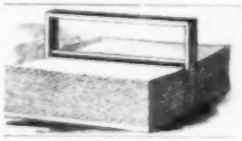
To facilitate the work of loading a heavy railway engine and its tender aboard the freighter "Cordova" at Seattle, for shipment to Alaska, special tracks were recently laid across the deck of the vessel and the wharf where it was berthed. At the moment the tide was most accommodating, the equipment was run onto the ship and made fast for the ocean voyage.



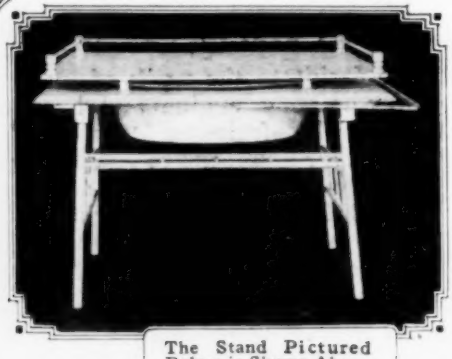
The Locomotive and Tender Made Fast on the "Cordova's" Deck for Shipment to Alaska

NEAT PAPER-NAPKIN HOLDER FOR SELF-SERVICE CAFES

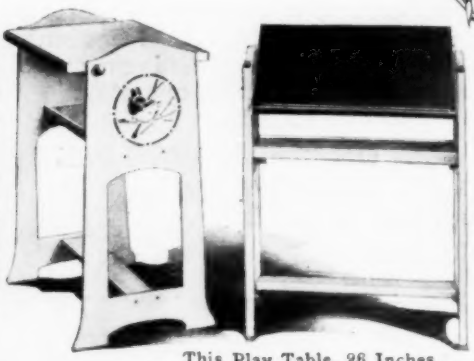
For dairy-lunch rooms and cafeterias in which one is his own waiter, an apparently satisfactory rack has been introduced to keep paper napkins in an orderly stack. Extending above a square base, of the same size as the napkins piled upon it, is a frame with two channel uprights that accommodate a heavy rod. Although free to revolve, the roller weights the napkins and prevents them from being scattered by drafts. As the pile is reduced, the rod descends.



ATTRACTIVE NEW ARTICLES FOR THE NURSERY

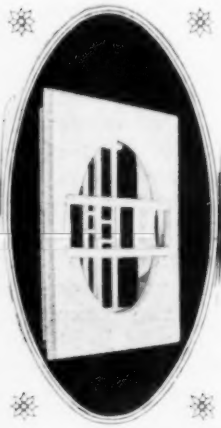


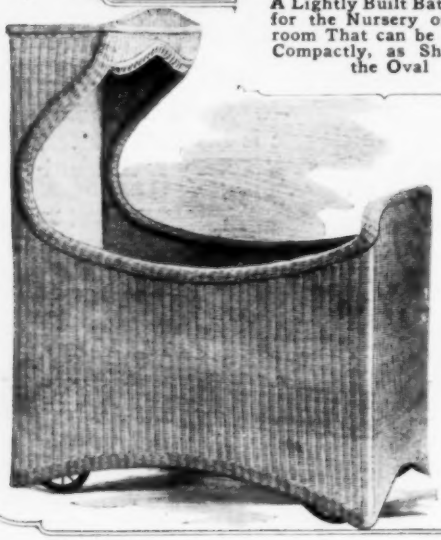
The Stand Pictured Below is Shown Above as a Dressing Table with a Removable Top



This Play Table, 26 Inches High, Has a Revolving Top, One Side of Which Is a Blackboard

A Lightly Built Bath Stand for the Nursery or Bathroom That can be Folded Compactly, as Shown in the Oval



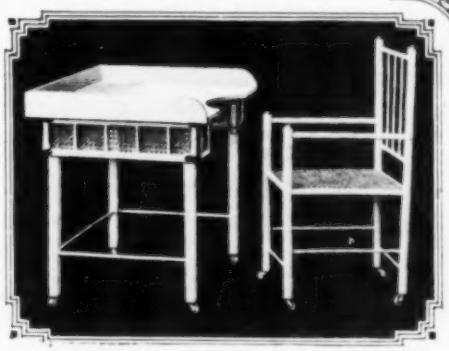


The Graceful Canopy Gives a Distinctive Touch to This Reed Crib. Hidden Rubber Tires Make It Easy to Move

The Back of This High Chair Lets Down, Making It Easy to Lift the Baby Out. The Tray, Having a Drop Edge, Is Convenient to Clean

AND OTHER FURNITURE FOR SMALL CHILDREN

A Strongly Made Little Desk and Chair Whose Style and Decorations would Delight Any Child



A Little Table and Chair for the Child That Plays Alone or Eats His Meals by Himself

A Baby Bed Built High for the Mother's Convenience: The Cretonne Canopy Matches the Wardrobe. In the Oval the Bed is Shown Folded

Broad-Based, Bright-Hued Candlesticks Whose Patterns are Just Suited to the Nursery

The Mattress of This Bed is Kept Flat by a Support Resting on Springs at the Corners. The Guard Rails Are Removable

MANDOLIN OF ODD DESIGN HAS UNUSUAL FEATURES

A mandolin of most unusual design appeals to those musicians whose purposes demand the utmost in ornamentation. The odd construction provides an instrument of the greatest rigidity and one less likely to bend at the neck under the strain of the string tension. The shape also aids in producing a volume of sound that carries well. The neck being attached to the thin part of the sounding box gives a maximum of tone vibrations.

UMBRELLA STOWAGE SPACE IN PLEASURE CAR

One of the convenient body refinements present in a late model of a standard motor car is an umbrella compartment. A neatly fitted leather flap covers an opening provided in one of the sides through which an umbrella, parasol, or walking stick may be introduced into a depository constructed between the upholstery and outer wall.

GERMAN SOAP SUBSTITUTE CLOGS SEWERS

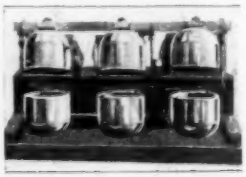
Although the resourcefulness of the Germans has enabled them to find a fatless substitute for soap in the form of a fine clay, or kaolin, used in combination with slaked lime, the new preparation has not been used without unpleasant consequences. As a result of an investigation it was found that a large number of drains and sewers had become clogged by the clay which, together with vegetable waste, accumulated rapidly in the pipes.

SMALL CHURCH HOUSES LARGE CONGREGATION

A diminutive church in a western city accommodates a fairly large congregation by the elimination of pews, organ, and most of the property that ordinarily constitutes the furnishings of such an institution. The religious belief of the congregation banishes seats and other equipment as nonessential to the most devout worship, so they stand up for two hours during the service every Sunday. Rare and sacred pictures are used to adorn the walls. No service is ever held in the church without candles burning, regardless of how brilliantly the sun may be shining outside.

SOUNDS OF HORSES' HOOFS CORRECTLY IMITATED

To imitate the sounds of horses' hoofs in connection with music and theatricals a westerner has produced a vacuum-controlled machine which is operated independently, or in conjunction with the keyboard of a piano or organ. Three pairs of wooden cups are clapped together by the mechanism to produce the sounds. Adjustments regulate the volume so that the sounds of horses walking, trotting, or galloping, either near or far away, are correctly imitated.



INTIMATE GLIMPSES OF BILLINGS, MONTANA

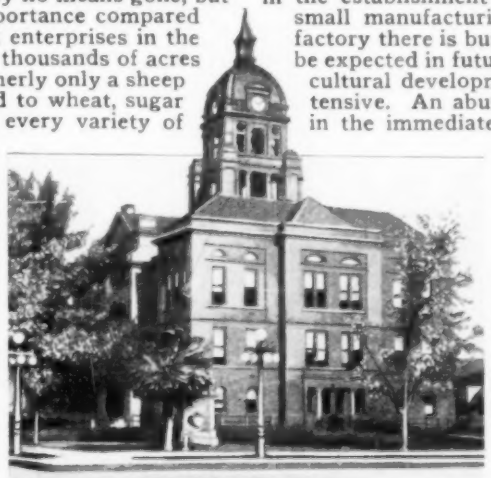
By OUR TRAVELING EDITOR

THIS is the second of a series of articles describing cities of the United States. Last month the topic was Salem, Oregon. Our traveling editor visits the places in person and makes his own photographs, with an eye to the typical and interesting. Every community so far visited presents something decidedly characteristic and worthy of study.—Editor.

IN Billings we have a town which to all appearance is the very embodiment of progressiveness and hustle. It is a town which in a few years has grown from a mere sheep market into as fine a city of its size as there is west of the Mississippi River. The growth of the place has all been brought about by the changing of the surrounding country from a sheep pasture to a vast farm. The sheep industry is by no means gone, but it is now of minor importance compared with other agricultural enterprises in the vicinity. Hundreds of thousands of acres of land which was formerly only a sheep range is now cultivated to wheat, sugar beets, hay crops, and every variety of vegetable. Billings is logically the great agricultural shipping, distributing, and merchandising center for the entire district.

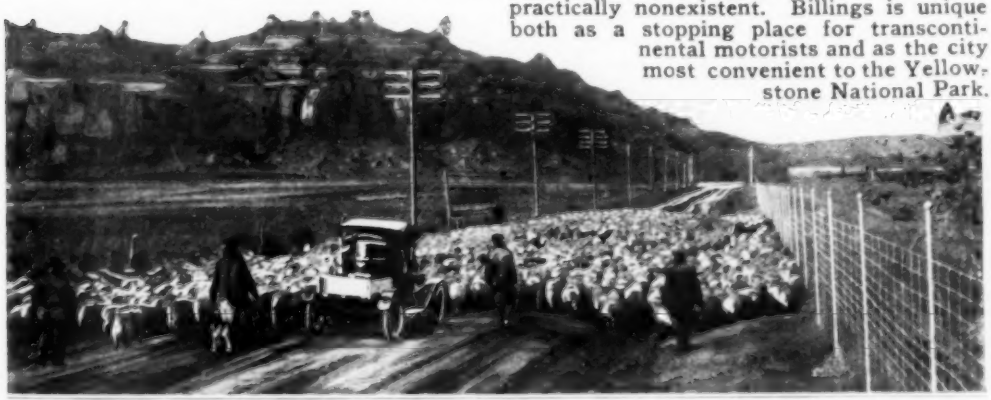
The spaciousness of the town is one of the most impressive things to the first-time tourist. The streets are all wide enough to do credit to many cities having a population of a million, and in every sense of the word the town is strictly up to the minute. Most of the buildings are nice and new, and about everything there is that air of hustle and prosperity which characterizes a community that is really alive. One doesn't have to travel far in the vicinity of Billings to realize that the development of the city is practically unlimited. There is an abundance of excellent farm land everywhere awaiting the first plow thrust, which can now be bought at a very low price.

Billings is also sure to become more or less of an industrial center. The demand for farm equipment already has resulted in the establishment of quite a number of small manufacturing plants. The sugar factory there is but a sample of what may be expected in future years when the agricultural development becomes more intensive. An abundance of water power in the immediate vicinity only remains to be developed to take care of the power situation. A great beet sugar plant is now operated on this power, which is derived from the Missouri River.



The Yellowstone County Courthouse Is a Handsome Modern Structure and One of the Countryside's Most Conspicuous Landmarks

Being situated on two transcontinental rail lines, Billings' transportation facilities to the east and west are all that could be desired. Lack of railroads communicating north and south, however, has seriously hampered the development of the vast agricultural regions in those directions. The general adoption of motor trucks by the ranchmen has largely overcome this difficulty, even though satisfactory motor highways in the vicinity are practically nonexistent. Billings is unique both as a stopping place for transcontinental motorists and as the city most convenient to the Yellowstone National Park.



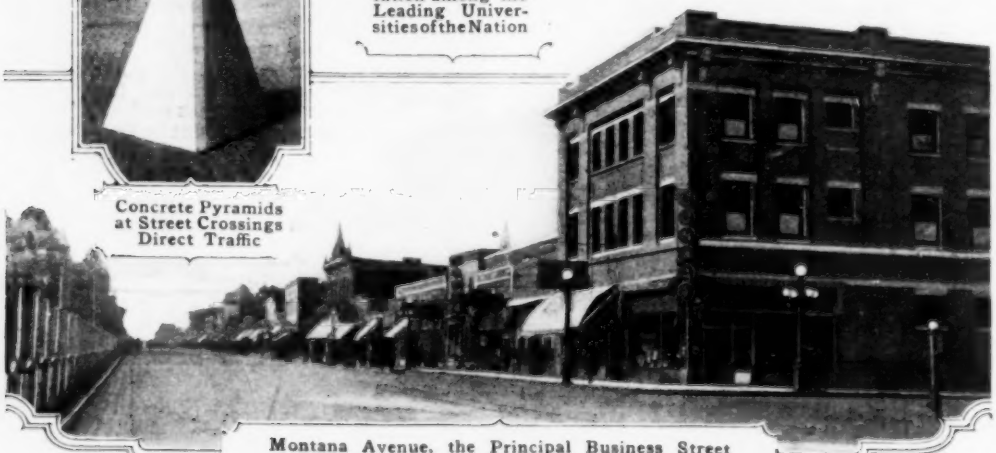
About One Sheep in Every Hundred Is a Black One. Thus Herders Estimate the Number of Animals in a Flock by Counting the Black Sheep

This Handsome Pressed-Brick Structure with Tile Roof Is the Yellowstone County Jail. It Is an Excellent Type of Small Prison

The Billings High School Is a Fully Accredited Institution among the Leading Universities of the Nation

Fountain Erected in Tribute to One of the County's Officials

Concrete Pyramids at Street Crossings Direct Traffic



Montana Avenue, the Principal Business Street of Billings, Has an Air of Hustle and Progress About It That Seems to Characterize the City

The Billings Exposition Building Is a Structure Erected for Housing the Yellowstone County Fair, Stock Shows, and Similar Events

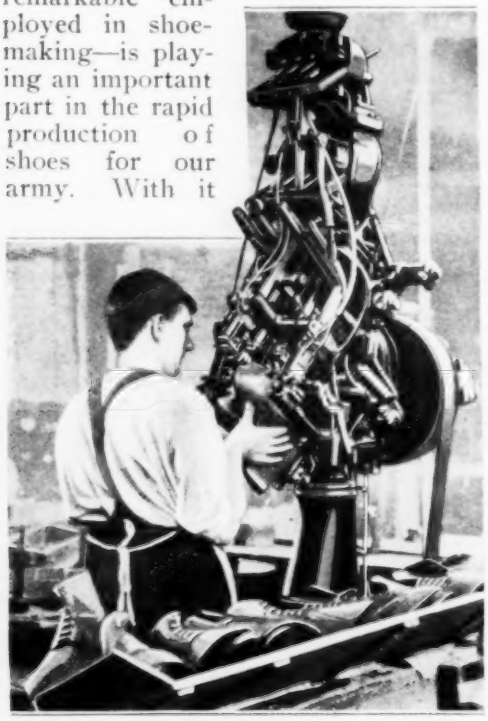
Stock Yards Sheep are Identified by Spotting Their Wool with Paint

In Montana Avenue Just West of the Business District, the Parmly Billings Public Library is Usually Pointed Out to the Tourist

A Mammoth Beet-Sugar Factory is Now Operating 24 Hours Each Day, Furnishing a Substantial Contribution Toward Relief of the Present Sugar Shortage

REMARKABLE MACHINE AIDS IN MAKING ARMY SHOES

The machine shown in the accompanying illustration—one of the most remarkable employed in shoemaking—is playing an important part in the rapid production of shoes for our army. With it the uppers of 500 to 600 pairs per day can be pulled tightly over their lasts and fashioned to fit the human foot. Formerly this operation was done by hand, one workman being able to "pull over" from 80 to 100 pairs per day.

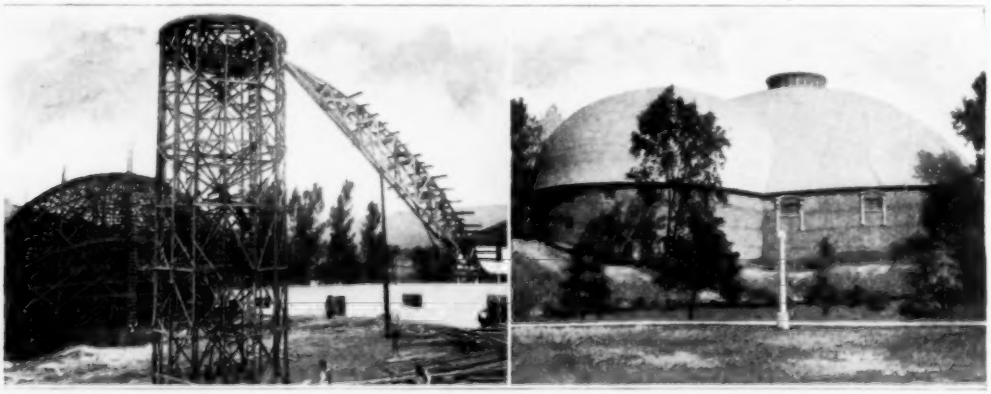


One of the Most Complex Machines Used in Making Shoes: It Stretches Uppers over the Lasts at a Surprisingly Rapid Rate

CHAUTAUQUA AUDITORIUM WITH MUSHROOM ROOF

On account of its unusual appearance and certain exceptional features in its construction, special interest attaches to the new Chautauqua auditorium at Ashland, Ore., which has a seating capacity of 4,000. The audience room is circular in shape, and 160 ft. in diameter. A circular concrete wall, 12 ft. high, supports the dome, which is a portion of a sphere having a radius of 90 ft. The natural slope of the site has been utilized in the arrangement of seats. The stage is semicircular in form, with a proscenium arch 60 ft. wide and having a roof of the same type as that of the audience room to which it is joined.

The framework of the superstructure is composed of trusses that converge at the top of the dome and are made of very light lumber, 4 by 1-in. sheathing being used for the purpose. A temporary central tower was built to hold these in place until all were erected. The roof is entirely self-supporting, leaving the area beneath without any pillars to obstruct the view. The framework of ribs is covered with ¾ by 1⅛-in. strips, and this is overlaid with three-ply asbestos, forming a white dome, striking in appearance.



Left: Beginning the Construction of the Roof, Showing the Temporary Central Tower and the First of the Wooden Trusses to be Put in Place. Right: The Mushroomlike Auditorium in Ashland, Oregon, Completed. It Has Concrete Walls and a Roof Made of Very Light Lumber, Covered with Three-Ply Asbestos

OPERATING A FISH FARM FOR PROFIT

By ALBERT MARPLE

Spring-Fed Body of Water in California Which has been Transformed at Small Expense into a Profitable Fish Farm, Supplying City Cafés with Fresh Fish

A NEW industry for the man of small means has just made its appearance in the western part of this country, namely, the systematic growing of fresh fish for market. That financial success may be gained in this unusual work has been demonstrated by a "fish farm" near Watts, Calif. In addition to being repaid financially for his work, the proprietor has converted an unsightly storm-water ditch into one of the most beautiful fish ponds imaginable, thereby enhancing the value of his property. The claim for this new industry is that, if properly cared for, 800 breeding fish placed in a home pond will have increased sufficiently in three years to bring the owner a steady return of at least $5 per day.

After securing a suitable piece of property, the next step is to line the sides of the ditch for a considerable distance with rocks, placed with small openings or holes between them, so that at spawning time the females may hide themselves away in the crevices. This done, sea moss should be planted upon the floor of the ditch, while along the shores; bulrushes, mint, and other plants may be set out. This moss and the roots of the plants constitute the food upon which the fish subsist. Along with these, aquatic plants may be grown on the water, upon the roots of which grow small snails that constitute a valuable food element. The ditch completed, the water is turned into it and kept at a given level for six months before the fish are placed. This is done in order that the ground around the pond may become thoroughly water-soaked, and that the plants may grow sufficiently to furnish enough food for the fish.

In the successful conducting of a fish farm it is essential that the water supply be continuous, or nearly so. A flowing spring is ideal for this purpose, or, if this is not available, the family windmill may be mustered into service, or lacking this, a well may be sunk and a mill erected near one end of the pond, the outlet being at the other. While a great amount of fresh water is not required, the supply should be quite uniform in volume.

The pond on the California farm is about 700 feet long, 20 feet wide, and

4 feet deep, the depth advised by the state authorities. Having the pond this width facilitates seining. The owner's present method is to have a net about 10 feet in width and sufficiently long to reach across the pond easily. On being opened, this net, which is equipped with weights, is lowered to the bottom of the pond and permitted to remain there for a few minutes, after which stale bread, broken into small pieces, is thrown into the water above the net. This attracts the fish in large numbers and at a given moment the net is drawn up, the result being a good haul. The mesh of the net is sufficiently large to permit the small fish to drop back into the pond, while those of marketable size are retained.

A novel market for his output has been created by the proprietor. He arranged with a number of café owners in Los Angeles to install water-tight tanks in their places of business and within view of their patrons. From the farm the fish are taken in a tank automobile directly to the cafés and placed, alive, within these aquariums. Patrons wishing a fish dinner at these cafés have the privilege of selecting their own fish from the tanks, thereby making sure that they are fresh.

The fish grown on this farm are known as bluegill perch and blue and yellow-fin catfish, the latter having been transplanted to California from Florida. A perch of this type, when full grown, is about six inches in length and weighs about half a pound, three years being required to bring it to maturity. A three-year-old catfish will weigh about a pound and a half. The average price received by the grower is 40 cents a dozen for perch and 10 cents a pound for catfish.

Each female perch produces about 900 young every year, while the catfish multiply at a rate of about 1,200 every 12 months. It is estimated that in this fish farm at the present time there are 50,000 catfish and 100,000 perch, the greater percentage of which are not yet of marketable size. The farm has been in existence about two and a half years, and up to this time the fish have existed on the grasses and moss that grow in the water, and the only financial outlay was for the improvement of the ditch and for the 800 breeding stock, which were furnished by the state hatchery at a cost of $10 per hundred. The water for this ranch is furnished by a flowing spring which is located near one end of the pond.

LIFE OF SNUBBING POSTS AVERAGES TWELVE YEARS

The unexplained difference in the length of life of snubbing posts, located adjacent to canal locks, has often been a subject of discussion, for it has been found that of two posts cut from the same tree, set at the same time, and undergoing the same usage, one may outlast the other by several years. On the Chesapeake and Ohio Canal, where the accompanying illustration was taken, the average life of a snubbing post is 12 years, the records show. During the eight years that the post shown here has been in place, the taut canal-boat ropes wound about it have worn deep grooves in the wood and it is doubtful whether it will last two years more. All posts on this canal are obtained from a locust grove, this wood being preferred to oak or hickory because it will not rot so quickly in the ground.

¶ The government has notified 500 Georgia pine mills that an embargo has been placed on all timbers over 2 in. thick and 10 in. wide, as all such lumber must be reserved for shipbuilding, except in cases that can be shown to be very urgent.

GROW LICORICE PLANTS IN NEW JERSEY

Important experiments in the production of licorice, backed by a large tobacco company, are now under way in New Jersey. If the venture succeeds, as experts predict, the very serious shortage in licorice caused by the war will be relieved, and sandy New Jersey land, now yielding the most meager farm crops, will be made more productive. The climate of the region, except in the depth of winter, is declared to be similar to that of lands bordering on the Mediterranean, which produce much of the world's present licorice supply. The experimenters believe that their plants, which already have been growing several months, are so hardy that the roots will withstand freezing weather and increase in size from year to year even though the tops are killed. The plants are set out at intervals of 18 in. in rows 4 ft. apart. Varying amounts of fertilizer have been added to the soil to determine the best condition for the plants.

IMPROVED INKING PAD HAS CUSHIONED BASE

An improved inking pad for hand stamps is provided with a cushioned base so that it can be used almost noiselessly and without marring the table top. The base being flexible, all parts of the stamp are more apt to be inked uniformly when pressed down upon the pad.

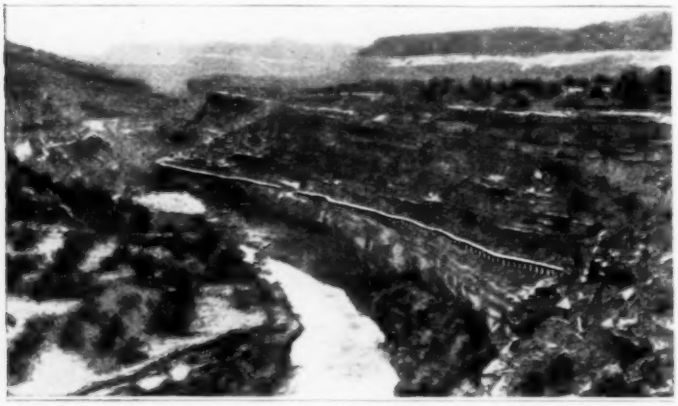
CAPTURED HUN SUBMARINE EXHIBITED IN AMERICA

One of the most extraordinary sights that ever thrilled New York was that of a German submarine being hauled through the streets to Central Park in three sections. The boat is the "UC-5" which was captured by a British man-of-war. It is a mine-laying type, 110 ft. long, and of approximately 200 tons' displacement. As the sections were hauled through the streets on trucks, each drawn by 42 horses, the enormous weight broke the pavement in many places. The craft has been rechristened the "U-Buy a Bond" and is to be exhibited throughout the United States and Canada to stimulate patriotism.

One of the Three Sections of the Submarine being Hauled Away from the Steamship Docks

USELESS FLUME MONUMENT OF ILL-FATED FORTUNE

In the San Miguel River cañon, Montrose County, Col., there is a strange monument to a million-dollar mistake. Extending for 12 miles along one of the precipitous walls of the gorge is a dilapidated wooden flume, built some 27 years ago to carry water to a placer mine near the Utah line. To construct it, scores of men were lowered on ropes over the edge of the cliff. About $5 worth of "flour" gold, it is said, was recovered before the now unclaimed flume was abandoned.



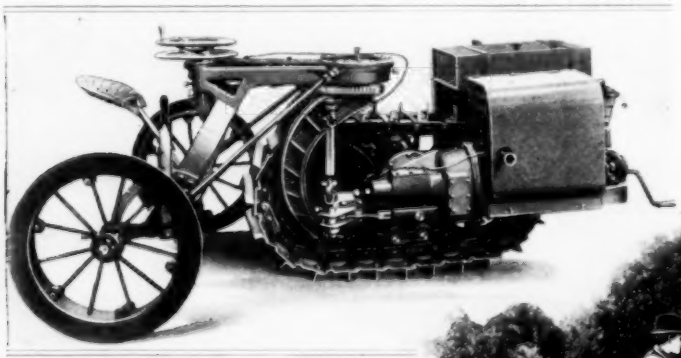
In the Picture Above the Old Flume Extends Like a Ledge along the Right Wall of the Cañon. At Many Points It is Broken and the Rocks are Littered with Its Timbers

OVERLAND ROUTE FOR WAR TRUCKS BEING CHOSEN

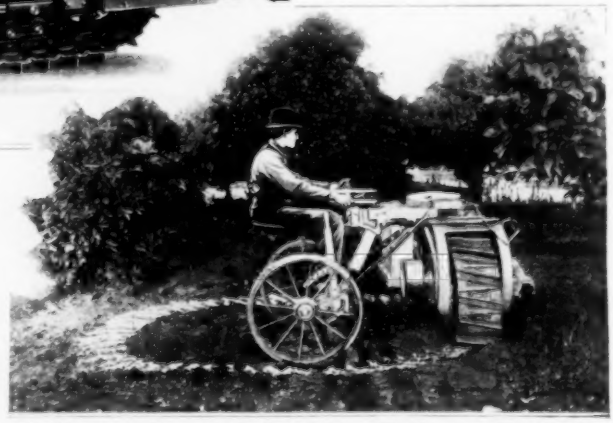
A motor truck was recently dispatched from Detroit to pick out the best highway from that city to the Atlantic coast. The route selected is already being followed by trains of government motor trucks carrying war supplies to points of embarkation. By this arrangement the railways will be materially relieved.

SMALL ORCHARD TRACTOR OF NEW DESIGN

Radical departure from the standard type of tractor is to be found in a machine now being sold to orchardists and others demanding a tractor that is low, narrow, and moderately priced. It travels on two flanged wheels and on an endless traction belt, provided with diagonal cleats, that is driven by a gasoline engine. The driver sits above the two wheels and guides the machine with a steering wheel. The tractor can be turned around within a



The Light Construction and Compactness of This Tractor Make It Especially Suited to Orchard and Small Farm Cultivation

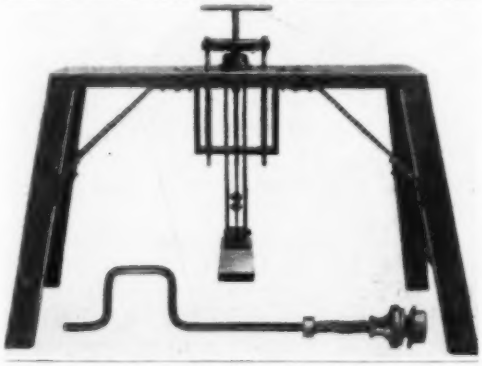


The Tractor's Drawbar Pull is Said to Be Equal to That of Six Horses. It can Turn in a Radius of Five Feet

radius of 5 ft. and, when desirable, can be used to plow beneath the branches of fruit trees without injuring them.

TWO TOOLS LESSEN WORK OF CLEANING BOILERS

Two implements recently put to use in a waterworks plant are said to greatly lessen the labor of cleaning boilers. One consists of a rod, bent at one end to form a handle, and having at the other end a collar and projecting scrapers that remove the coating from the sides of a tube, when the tool is inserted in the latter and turned around like an auger. Mounted behind the scraper is a movable disk that serves as a guide by keeping the tool centered. It is backed by a tension spring that can be set at any point desired. The other implement is employed in cleaning the handhole caps, or plates, and consists of a treadle-controlled clamp mounted on a wooden horse. The plate



Above: Implement for Cleaning Handhole Caps, One of Which is Shown in the Clamp. Below: Scraper Used for Cleaning Boiler Tubes

to be cleaned is held in the clamp and turned around with a wrench, or key, so that files attached to the clamp head scrape off all accumulated deposit.

CONCRETE STAIRS DISPLACE WOODEN PILGRIMAGE STEPS

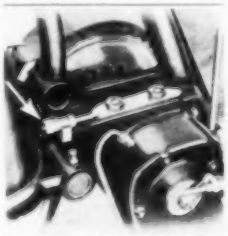
Reinforced-concrete stairs have replaced the wooden pilgrimage steps up which the pious have climbed to the chapel on Mt. Adams, overlooking Cincinnati, for many years. On Good Fridays, and at other times, scores of persons ascend the hill, repeating a prayer

Repeating a Prayer on Each Step, the Pilgrims Ascend the New Stairway to Mt. Adams

for each step. Frequently worshipers who are especially repentant offer several supplications on each tread and spend most of the day in reaching the top. Because heavily loaded for protracted periods, the old framework grew to be regarded as unsafe. The new structure has 147 steps and is supported by concrete pillars.

MOTORCYCLE CHAINS NOW EASY TO ADJUST

Instant and accurate adjustment of the tension of motorcycle driving chains is accomplished by a small jackscrew appliance mounted atop the gearbox fastenings. The adjustment regulates the chain tension by moving the gearbox forward or backward. A source of much difficulty is thus obviated.



NEW WORLD'S GRAIN ROUTE OPENED

By FRANCIS J. DICKIE

A NEW route for grain across the face of the world from the great prairies of Canada to Great Britain was opened the second week in November with the sailing from the port of Vancouver, B. C., of an 8,800-ton British steamer, carrying 100,000 bu. of Canadian prairie-grown wheat to Liverpool via the Panama Canal. At this time the event is of world importance, and though it is at present difficult to divert Atlantic shipping to the port of Vancouver, this trouble may shortly be overcome, for a $50,000,000 shipbuilding program is now under way at that city and at other points along the British Columbia coast. This entails the building of 41 wooden ships, of which 12, already completed, are of the old windjammer type, carrying five masts, and being equipped with auxiliary engines. Twenty-seven wooden steam vessels are being built for the imperial munitions board, and 12 ships of steel, averaging 8,800 tons. Two of the latter have already been launched. With the rapid completion of these, Pacific-built ships will be able to carry the grain from Vancouver.

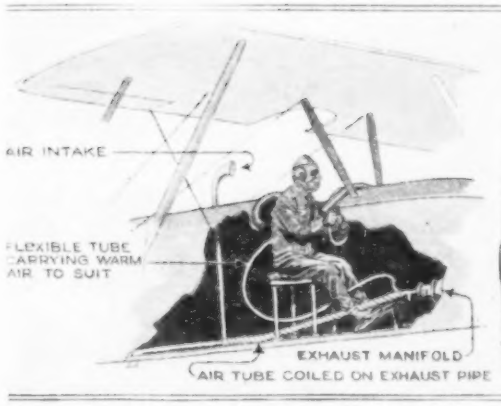
The project to ship grain from this port via Panama has been much discussed, and in connection with it some interesting facts in transportation come into play.

By the completion of the Panama Canal the distance from Vancouver to Liverpool was reduced from 15,000 to 8,836 miles, a cut equivalent to 23 days' timesaving for the average freight steamer. At Vancouver three great railways, the Canadian Northern, the Canadian Pacific, and the Great Northern—all of which tap immense wheat-producing areas—have their terminals. Formerly the route for wheat from the Canadian prairies, and one at present in use, was to ship to the lake port of Fort William, on Lake Superior, thence across the lakes and on to various Atlantic ports. But this route is closed five months in the year, and as the bulk of the western grain is threshed late, much has to lie in storage. With the opening of the Vancouver-Panama-Great Britain route, much of this wheat can go over the mountains to the Pacific cheaper than to the Atlantic, saving storage, and also, in some cases, a substantial percentage of the carrying charges.

Perhaps the most important development in connection with the Vancouver-Panama-Great Britain route is the string of vast storage bins that the Canadian government has erected across the prairies during the last four years. All of these but one are within the cheaper shipping radius to the Pacific. They are built at the following cities, and their capacity and completion dates are as follows: Port Arthur, capacity, 3,500,000 bu., completed 1913; Moose Jaw, 3,500,000 bu., 1914; Saskatoon, 3,500,000 bu., 1914; Calgary, 3,000,000 bu., 1916; Vancouver, 1,250,000 bu., 1916. The last to be completed, and by reason of its tidewater location the smallest, at Vancouver, has an unloading capacity of 60,000 bu. an hour, and is so constructed that four steamers can load at once.

The history, and, it might almost be said, the fate of Great Britain and the United States, are so inseparably linked with the growth and handling of wheat that this opening of a new route is of world-wide interest. The recent sailing of the ship from Vancouver with its first trial shipment of 100,000 bu., marks a new epoch in grain transportation.

¶The extraordinarily heavy losses which burglary-insurance companies in Chicago have suffered in recent months has induced the majority of these concerns to join an association which is now investigating various burglar alarms and urging policyholders to install some form of protective apparatus that has been found practical.



Circulating through the Air Ducts, and Rising around the Body, the Heat Keeps a Flier Warm When Traveling at High Altitudes

While He Is at the Wheel the Pilot's Movements are Not Hampered by the Air Tube. Disconnection Requires but a Second When Leaving the Craft after Descending

WARM AIR IS CIRCULATED THROUGH FLIER'S SUIT

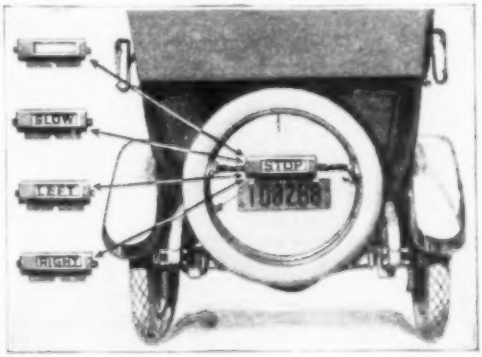
To protect military airmen from the intense cold of the upper atmosphere and also free them from the burden of cumbersome, heavy garments, an air-heated one-piece costume has been designed. The suit is made of two layers of material and supplied with a system of air conduits extending to its various extremities. Air, taken in through a funnel mounted behind the propeller and warmed by passage through a coil encircling the motor's exhaust pipe, is carried into the main artery of the suit by a flexible tubing connected at the rear. The heat circulates into the gloves and shoes worn by the airman and rises around his body, while cool air passes out through valves.

DECORATIVE DEPARTMENT HELPS PAINT SALES

A paint and varnish manufacturer has instituted a decorative department which renders free service to architects and others interested in exterior or interior decorations. If plans of the building are submitted, the department will present suitable decorating schemes, even including draperies and furniture. The system aids the company's agents to sell paints and other decorating materials.

AUTOMOBILE SIGNAL LAMP WARNS TRAFFIC IN REAR

Movement of a small lever installed on the steering wheel actuates the mechanism of a signaling tail lamp for motor cars, and displays, at the discretion of the chauffeur, a red light or any one of the four words, right, left, slow, stop. Connection between the operating lever and the cylinder that carries the stencil words is made by a flexible shaft.



The Cylinder Carrying the Stencil Words is Turned by a Flexible Shaft Connecting It with a Lever on the Steering Wheel

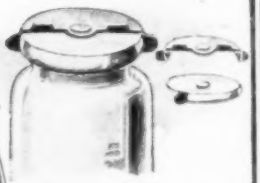
SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Heavy, Ribbed Motor Hose in Colors Matching Cloaks and Supplied with Leather Soles and Openings for Heels of Pumps. Price $3

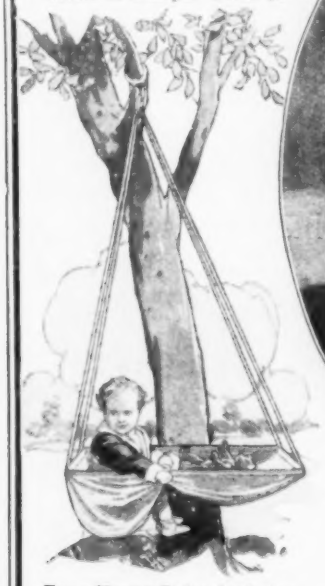
Curved, Velvet-Lined Shield for Eyeglasses: It is Used without Removal from Pocket. Price $1

Firm-Gripping, Easily Used Lifter That Facilitates Removal of Fruit Jars from Boiling Water

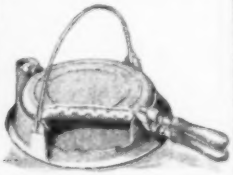
Serviceability Is the Outstanding Point of This Attractive Tea-Service Tray and Its Raffia-Bound Folding Support. Price $7.50



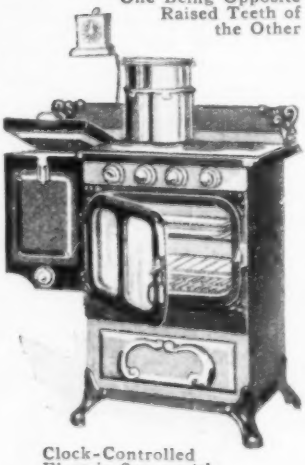
Quick-Opening Top for Bottles and Jars: It Consists of Two Metal Parts Riveted to Work Eccentrically



For a Young Baby the Swing Serves as a Bassinet. Later a Simple Adjustment Makes the Happy Combination Shown Here. Price $2



The Two Plates of This Waffle Iron Fit into Each Other, Depressions in One Being Opposite Raised Teeth of the Other



Clock-Controlled Electric Stove with Heat-Retaining, Slow-Cooking Compartment

By Slipping On the Top Piece, the Six-Pound Gas Domestic Iron Becomes an Eight-Pound Laundry Iron

Boudoir Clock Finished Either in Gold with Polychrome Flowers, or in White Enamel with Colored Ones. Price $6

An Ornate as Well as Thoroughly Practical Yarn Holder for the Woman Who Knits. Price $6

Kitchen Table with Built-In Ironing Board That Drops into Concealed Position

Easily Attached Auto Seat for the Baby, Made of Duck and Provided with Holes through Which Child's Legs Pass

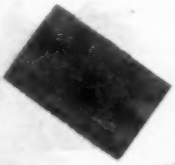
Army Ring with Locket Top That Holds Photograph. Price $10

Attractive Pedestal Clock and Calendar, Especially Suited for Sewing Room or Den. Price $30

For Those Who Do a Great Deal of Knitting These War Times, the Yarn Winder Shown Here Is a Helpful Accessory

Soft Collar Supplied with Loops That Hold Scarf in Proper Position

For the War Worker: A Convenient Knitting Apron That Is Always Dainty and Fresh-Looking



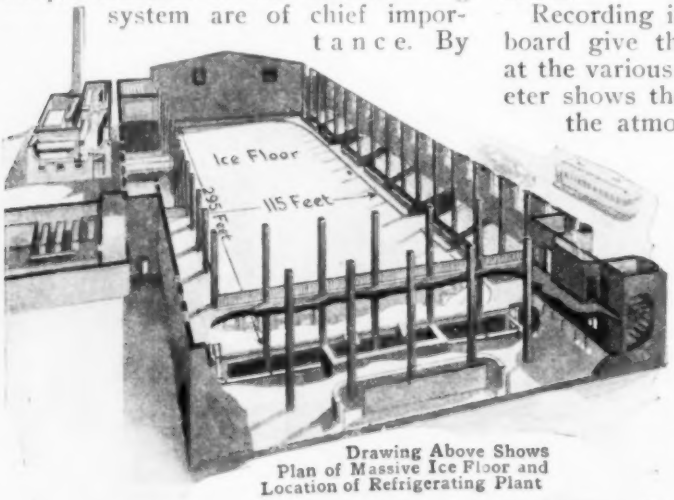
For Soldiers: Leather Correspondence Case with Materials. It Fits the Pocket

Decorated Shield That Keeps Telephone Mouthpiece Free from Dust. Price $1.20

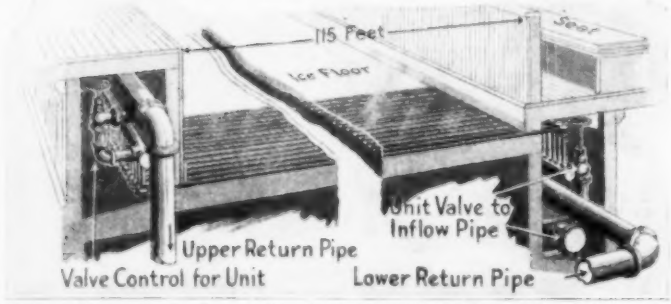
Service Buttons for Coat Lapel, Available in Celluloid and Metal, at Various Prices

CONTROL SYSTEM KEEPS ICE SMOOTH IN GREATEST RINK

What is conceded to be the largest indoor skating rink in operation has been established at Chicago. Its ice floor is 115 by 295 ft. and has sweeping curves instead of corners, so that the entire area is utilized. Although its size gives it a certain distinction, the unique features of its ice-controlling system are of chief importance. By a new process of regulation the skating surface is maintained at the "welding heat," or close to the melting point, so that it remains free from water, cuts, cracks, and ice dust. About 20 miles of 1-in. pipe, through which the brine is circulated, is laid on a sand bed and forms the freezing medium of the floor. Exhaust-steam coils and motor-driven fans are installed in heating chambers near the roof so that warm air can be turned into the arena at will. In an upper corner is a cooling room from which cold air is discharged by a 12-ft. fan. Five 4-ft. fans are also mounted at different points to provide circulation. Imbedded in the ice floor are several electric-resistance thermometers, while other electric thermometers are installed in the brine pipes and suspended from the roof of the arena.



Drawing Above Shows Plan of Massive Ice Floor and Location of Refrigerating Plant



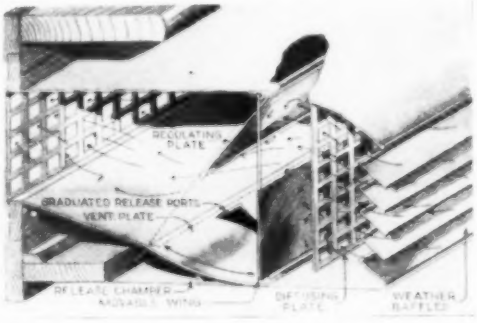
Glimpse beneath the Ice, Indicating Disposition of the Pipes, Which are So Arranged That Their Ends may be Opened to Permit Cleaning: Electric Thermometers, Air-Cooling and Heating Chambers, and Fans are Used in Regulating the Hardness of the Skating Surface

Recording instruments on a control board give the temperature readings at the various points, while a hygrometer shows the humidity, a barometer the atmospheric pressure, and a compass dial the direction of the wind. With these facilities it is possible to keep the body of the ice at degrees ranging from 20 to 24° F., while the surface is held at 32°. With the top of the ice maintained at the "welding heat" it melts under the pressure of skates and allows the latter to glide easily. The air circulating over the ice is so carefully controlled that there is no accumulation of shavings, for they melt, fill the skate grooves, and freeze so that the surface constantly repairs itself while hundreds of persons glide over it. After each skating session the floor is planed, rubbed down, and "veneered." The latter is accomplished by spraying with a special nozzle that throws a fine mist evenly over the top of the ice.

¶Travelers have recently reported that California's active volcano, Lassen Peak, apparently is becoming extinct, for its crater, once a seething caldron emitting jets of steam, is now only mildly active and is freezing over.

AUTOMATIC VENTILATOR FOR STREET CARS

Several hundred cars in a large city-traction system have been equipped with a new intake ventilator which has special merit in that it dispenses with power-driven fans, floor ventilators, etc., that tend to raise dust. With it fresh air is introduced well above the passengers' heads and the flow is automatically regulated according to the car's speed and the wind pressure. One of these intakes is installed at each end, in the roof, while exhaust ventilators are set in the roof along the sides. Air enters the forward intake through weather baffles and a diffusing screen and strikes a movable plate, or wing, hung vertically from the top of the intake. Pressure against this wing tends to swing it backward, automatically decreasing the size of an opening above it through which the air must pass and thereby keeping the volume of incoming air uniform under varying conditions. The lower edge of the wing swings back and forth close to a curved surface in which are V-shaped perforations. Part of the fresh air is diverted through these holes to the outside atmosphere, thereby keeping the current more stable and preventing the flapping of the regulator. When the car stands still the position of the wing



Intake Ventilator for Street Cars Which Automatically Regulates Current of Incoming Fresh Air Making Its Volume Uniform under Varying Conditions

provides an opening of the maximum size, while a speed of 20 miles per hour almost closes it, thus preventing too great a draft in the car.

DIVING BELL AND TUBING FIRST-RATE OCTOPUS

One of the thrilling scenes in an underwater photoplay, enjoyed by thousands of persons in all parts of the

Two Men Quartered Inside of the Bell Operated the Tentacles and Gave "Life" to the "Octopus"

country, is a realistic battle between a giant octopus and divers on the floor of the sea. Like many things in the movies, the fight was less exciting before the camera than on the screen. The "octopus" was a "camouflaged" diving bell supplied with rubber-hose tentacles that incased steel springs. It was animated by two men stationed inside of it. The inquisitive sharks that were visible in the picture, however, were real.

¶The National War Council of the Y. M. C. A., in planning for the equipment of 200 additional recreation buildings and tents which it will erect, has appealed to piano dealers in the vicinity of military camps to loan pianos for use in these amusement centers, pointing out that they can thereby render a patriotic service.

ELECTRICALLY HEATED SERVING TABLE

For the purpose of keeping warm food in a palatable condition after removal from the cook-stove, a serving table has been designed which is electrically heated. It is built

A Serving Table Provided with Three Electrically Heated Disks, on Which Dishes to be Kept Hot are Placed

with a single hollow pedestal, through which a flexible cord passes to three disk-shaped heating units, set in a larger removable disk that constitutes the center of the table top. Dishes to be kept warm are placed on these disks, which, in turn, may be heated to the desired temperature.

FOUR-CUT KEYHOLE SAW HAS DISTINCT ADVANTAGES

A four-cut woodworking saw, for use wherever rapid, irregular work is necessary, is now being manufactured.

For Trimming Out Keyholes or Any Irregular Woodworking the Slender Four-Edged Blade Is Invaluable

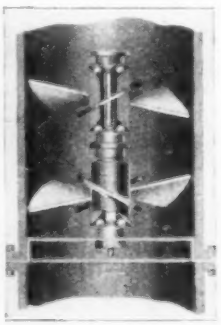
The four-sided cutting surface is especially useful for cutting keyholes. It fills the requirements of cabinetmakers, electricians, and others whose work demands a variety of holes in wood. While this tool is essentially a wood reamer, it may also be used as a rasp for either surface or interior work.

MOVIES USED TO TEST ARTIFICIAL LEGS

Motion pictures have recently proven helpful in making tests of artificial limbs, it having been found that neither the eyes of an observer nor the sensations of a wearer are wholly reliable. The method followed has been to fasten what is known as Geissler tubes to the subject, one along the thigh and one along the calf. The cripple is then made to walk in front of a motion-picture camera in a dark room, with the gas contents of the tubes made luminous by an electric current. The pictures taken amount to a series of diagrams, lines of light indicating the changes in the positions of the legs and revealing the differences in the movement of the artificial and the natural member.

TINY FANS VAPORIZE CARBURETED FUELS

A gasoline vaporizer which gives promise of meeting the demand for conservation and maximum efficiency from the present low-grade motor fuels has made its appearance on the market. The mechanism consists of two oppositely bladed fans mounted on races of steel balls on a journal within the juncture of the carburetor and intake pipes.



The tiny fans are revolved in opposite directions and at high speed by the suction of the motor. The carbureted gas, striking against them, is whirled about and chopped into atoms. More perfect vaporization, increasing mileage and efficiency, is the result.

WOULD ETCH OWNER'S NAME ON EACH CAR WINDSHIELD

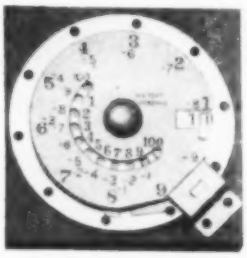
It has been proposed, as a means of checking auto thieves who have become a nation-wide menace, that a combination of makers, sellers, and buyers of motor cars be formed which shall see to it that ample identifying data are etched on the glass of each car windshield. This form of marking, it is contended, would be more difficult to alter or obliterate than any now in use. Each owner would be expected to carry an identification card bearing data corresponding to that on the windshield.

HEAT-RETAINING EGG CUP FOR BREAKFAST TABLE

To keep a hard or soft-boiled egg warm and palatable until it is to be eaten, a serving receptacle with a hollow space for hot water between its double walls has been designed. When the removable cup, with which it is supplied, is covered, steam reaches the inner compartment through perforations in the rim of the vessel.

TINY ADDING MACHINE FOR POCKET SERVICE

An adding machine, so simplified and compact that it may be carried in the pocket, and cheap enough to be within the reach of all who use figures, has been put on the market. The little device is of metal construction and housed in a wooden case. It is 2¾ in. square, ⅝ in. thick, and weighs but 2 oz. By turning the dial in a counterclockwise direction, results in subtraction are obtained.

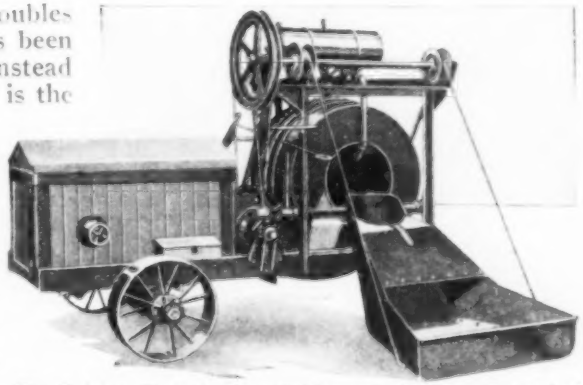


MANY CARLOADS OF PINON NUTS SHIPPED EAST

Unusual activity has characterized the piñon-nut trade in the Southwest the past season, it being reported that 28 cars, or more than 1,000,000 lb., of this product, which is gathered from a species of pine, have been shipped from one mountainous district in New Mexico to the eastern coast. The nuts are used in the making of confectionery, and for other purposes.

NONSLIPPING CHAIN DRIVE FOR CONCRETE MIXER

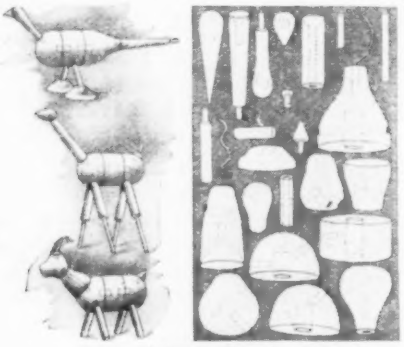
To overcome transmission troubles a new system of chain drive has been evolved for concrete mixers. Instead of encircling the mixer drum, as is the ordinary practice, the chain is extended beneath it and around an idler pulley on the outer roller shaft. The pull on it causes it to mesh properly with the sprocket teeth. This lifting tendency is also supposed to reduce the wear on the rollers. The arrangement insures a steady, even pull, it is claimed, and meets the difficulty due to the stretching of a chain.



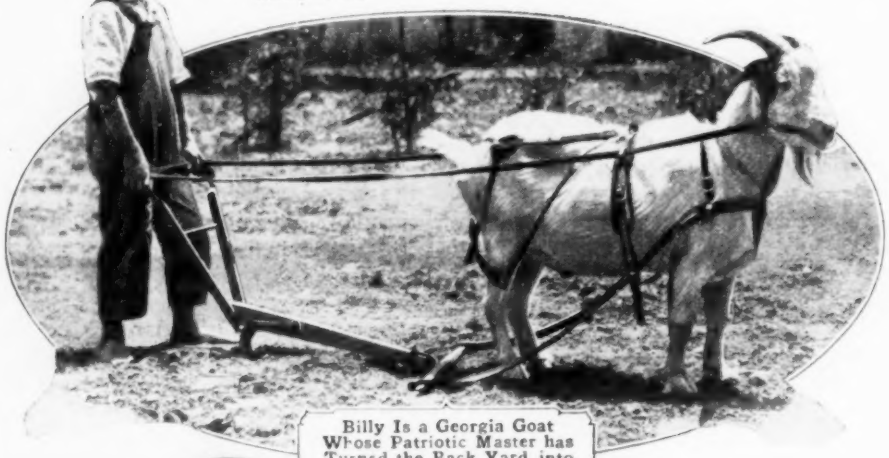
The Driving Chain is Extended beneath the Drum Instead of around It, to Prevent It from Slipping off the Sprockets When Stretched

SOME OF THE LATEST PRODUCTS FROM TOYLAND

A Game in Which Indians are Hotly Pursued by Cowboys: Fill the Box at the Top with Sand and as It Flows Down, the Toy Begins to Operate and the Exciting Chase Is On

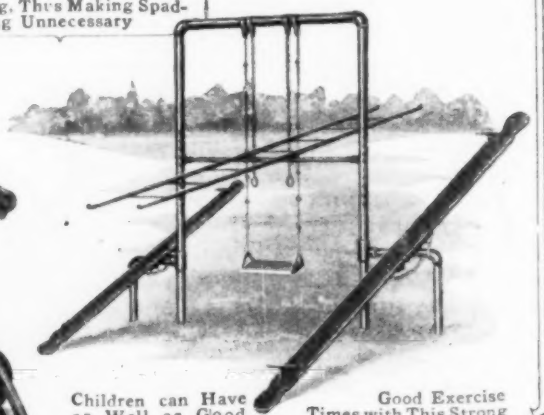


Animals Funnier Than Any on Land or Sea can be Made with These Interchangeable Blocks, the Units of Which are Shown at the Right



Billy Is a Georgia Goat Whose Patriotic Master has Turned the Back Yard into a Garden. The Pet has Done His Bit by Helping with the Plowing, Thus Making Spading Unnecessary

This Push Horse Is Different from Many, for While Traveling It Rocks Up and Down Like a Real Pony



Children can Have Good Exercise as Well as Good Times with This Strong Play Outfit. It Combines Two Teeters, Flying Rings, a Swing, Horizontal Bar, and Ladder

This Little Outfit will Delight Any Boy Who Wants to Study Electricity. With the Varied Apparatus He can Become Familiar with Motors, Dynamos, Wiring, Control of Current, and Other Electrical Problems

A Doll That Drinks Milk: In Reality the Milk Flows into the Hollow Arms. When a Hidden Spring Brings the Arms Down the Milk Flows Back into the Bottle

This Fine Shepherd Dog Lives near London and is Much Loved by the Children for He Guards His Home While the Men Are at War

This Pencil Writes with Bright-Colored Sand That Flows from the Barrel When the Spring at the Side is Pressed. Several Outlined Pictures Come with the Outfit

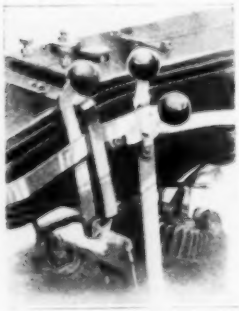
Here Is a Strongly Built Little Car Driven by a Motor Wheel at the Rear. It has a Headlight, a Brake Lever, and a Steering Wheel, Just Like a Big Automobile

MAKE STIFF DIGITS SUPPLE BY "PINCHING ZEPS"

Inflated leather-covered rubber bags shaped somewhat like Indian clubs are being employed at a British war hospital to assist convalescent soldiers in regaining the use of stiffened fingers and hands. While holding the devices the men strive to squeeze them, beginning at the thin end and working toward the large part as conditions improve. The exercise has proved valuable and is popularly known as "pinching Zeppelins."

AUXILIARY CONTROLS AID MOTORCYCLE EFFICIENCY

To relieve the handlebar control mechanism of the strain of lifting exhaust valves and provide more efficient motor control, a motorcycle is equipped with a hand valve-lifting lever located near the saddle on the side of the fuel tank. A hand lever operating the clutch is also used to apply the brake after the driving mechanism has been disengaged. A continuation of the movement necessary to release the clutch brings the brake into action.



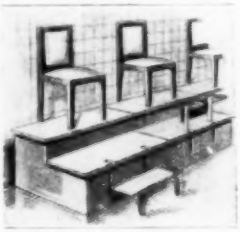
¶ For the purpose of saving a portion of the 15,000,000 tons of coal used annually in operating American artificial-ice factories and refrigerating plants the nation's fuel administrator is calling on individuals and ice companies alike to cut and store more natural ice than ever before.

DINING CARS SERVING "WAR PORTIONS" TO SAVE FOOD

Smaller helpings, designated on the menu cards as "war portions," are now being served on the Lackawanna Railroad dining cars, in addition to the regular service. This innovation, it is believed, will promote food conservation. The war-portion prices average about one-third less than the regular charges.

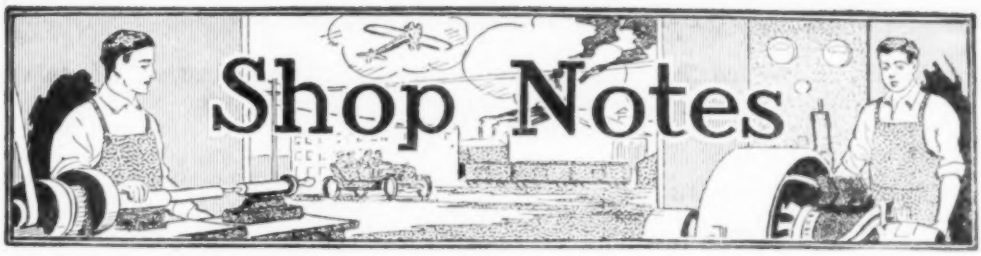
CONVENIENT NEW FEATURE IN SHOE-SHINING STAND

Each chair in an improved shoe-shining stand is provided with two hinged foot rests connected with a board attached to the uprights, so that when they are swung into a horizontal position they form a convenient step. The supports are counterbalanced, and lever-controlled latches are provided to hold them in either a vertical or a horizontal position. A further advantage of this arrangement is that the foot rests are out of the way except when in use.



"TRENCH CRANK" FOR MOVIE CAMERA USED IN WAR

To permit war photographers at the front to execute their work without needless exposure, an extension operating and adjusting crank has been designed for moving-picture cameras. With it a man can remain out of sight while the instrument is elevated above a trench parapet or the rim of a shell crater. A periscope enables the operator to see what he is photographing.

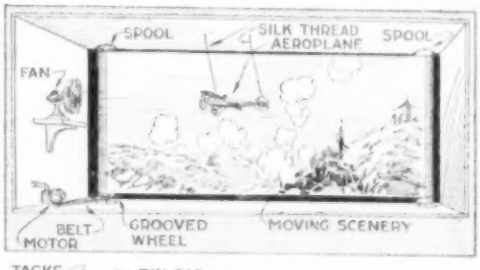


Air Scouting over Battle Fields in a Display Window

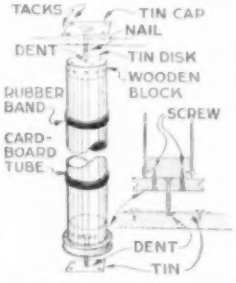
By LLOYD WORSWICK

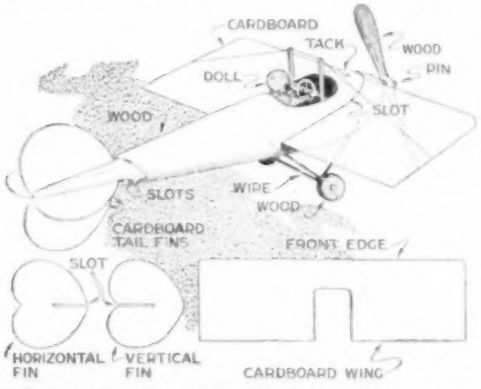
AN air scout on a perilous flight in search of the enemy's concealed batteries is seen braving death as he skims above the trenches in the show window of an enterprising merchant. The interest of the passer-by is gained, and he becomes curious to know how the effect is produced. The landscape, apparently moving by under the airplane, is a painted strip of muslin, a yard or more wide and about twice the length of the surface exposed as landscape. Oil colors or wax crayons can be used in making the picture, on the full length of the screen, which is set up as a continuous band moving around on the spools at the ends. The spools are wooden rods or cardboard tubes, fitted with end pivots and set up in suitable supports, the lower ends resting on tin bearings, and the upper ends mounted similarly, from the ceiling or other support.

The construction of the spools is shown in the detail sketch. Rubber bands are placed at intervals around the spools, and grip the muslin band, causing it to move around the spools like a belt. A grooved pulley is fastened to the lower end of the spool and this is belted to a small motor. The airplane is made to appear as if in flight by means of a draft directed in front of it from a fan suitably supported, as shown. The plane is supported by silk threads.



The Airplane in Flight over Ever-Changing Battle Fields Attracts the Passers-By and They Stop to Learn the Secret of the Effect





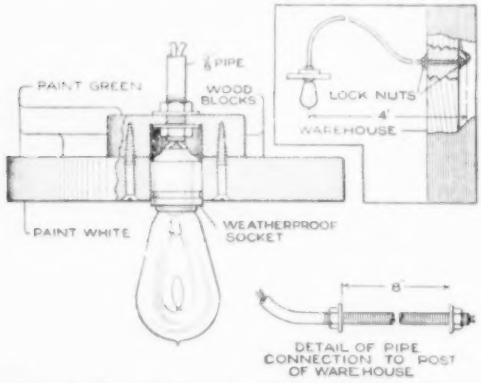
The Model War Plane Is an Interesting Construction, and Easily Built, Largely of Wood and Cardboard

The construction of the airplane is simple and interesting, as detailed in the sketch. It may be made in various sizes, 16 in. long being suitable. The pilot is a doll, preferably of some light material, and covered with brown paper or cloth. The plane is painted a "war gray," and is fastened together securely, as shown. The propeller is made of wood and is set in place on a bead-head pin. The wheels are wooden buttons, supported on wires. The electric fan is placed directly in a line

with the airplane so that the current of air will revolve the propeller, without blowing the machine to one side.

Weatherproof Gooseneck Light Fixture Cheaply Made

Practical and inexpensive light fixtures were required along the outside



Inexpensive Weatherproof Light Fixtures Were Homemade as Detailed

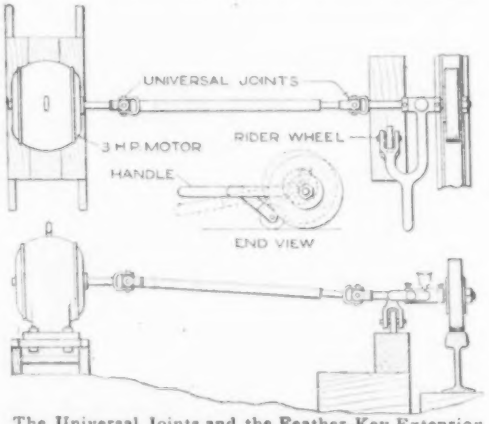
of a warehouse, and as no roof protection was afforded, the sockets and fittings had to be made weatherproof. Conduits of the gooseneck type were used to support the light, as shown. The straight end of the gooseneck was threaded and fitted with nuts and washers, by means of which the fixture was fastened to the supporting posts of the wall. The wires were carried in the conduit, and the fixture end of the latter was arranged as detailed, providing a weatherproof covering for the socket. Nuts with washers clamp the upper block, as shown, and the lower reflector is fastened with screws. The reflecting surface is painted white and the other parts green. The wires above the socket were taped carefully. —S. Frank Bill, Berkley, Va.

Ink Preliminary Sketches Prove Economical and Convenient

In making preliminary sketches, most of which were traced directly by a tracer or draftsman, it was found economical of time, and convenient as well, to make the sketches with ordinary writing ink instead of pencil. The writing ink was preferred also over India, or special drawing, ink because, by using a German-silver ruling pen, the designer was able to lay aside the filled pen now and then, instead of wiping it immediately, as is desirable with the usual pen and drafting ink. The time of the tracer was saved, and errors minimized by furnishing him with clean-cut sketches.

Motor-Driven Grinder for Rail Joints

The arrangement shown was devised for leveling joints in railway tracks, and is useful, also, for other forms of grinding. The power is taken from the trolley wire. The universal joints permit shifting of the motor without blocking it up to a level. The sleeve and extension shaft, joined with a feather key, permit the setting of the motor within a wider range. This feature is also desirable for grinding a wide area without moving the motor. After the rig is set up, the workman bears down on the handle, raising the emery wheel. The current is then turned on, and he lets the wheel rest on the rail. When a car is passing, one workman throws out the switch on the motor and takes the trolley from the wire, while another



The Universal Joints and the Feather-Key Extension Shaft Permit Satisfactory Operation under Varying Conditions

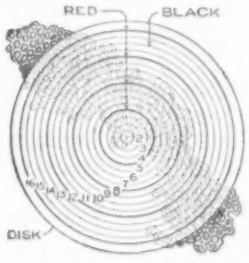
runs the emery wheel out of the way on the rider wheel.—Bert W. Brintnall, Seattle, Wash.

Soap Used in Bag Improves Auto Washing

A local garage owner cut down his soap bills considerably by a simple method. Instead of throwing the soap loosely into a bucket when washing cars, the washer puts the soap into a small flour bag, ties the top tightly and then places the bag of soap in the bucket of water. Soap left in the bag is used on another job. The old method never left any soap. A barrel of soap lasts one-third longer now than it did before using the bags, and the work is better, for when the water gets soapy enough the bag is taken out of the water.—L. E. Turner, Brighton, Mass.

Celluloid Fillet Indicator Handy for Draftsmen

Draftsmen who have had occasion to work on drawings requiring a large amount of corner filleting realize what a job it is to place the fillets accurately. To obviate a great deal of this, I cut a circular piece of thin celluloid, about 2½ in. in diameter, and sandpapered it on one side to a dull finish with a very fine grade of sandpaper. I then made a small hole in the center, and, on the dull side, scribed a number of concentric circles varying 1/16 in. in radius.



The circles of radii of ¼ in., ½ in., ¾ in., etc., were drawn in red to facilitate reading; the rest, in black India ink. The radii of all circles in sixteenths of inches were placed on the celluloid. In use, the circle of the given radius is placed tangent to the two lines where the fillet is required; the center is marked with the point of the compass, and the celluloid removed. Using this center, the fillet is drawn accurately.—Kenneth E. Ernst, New York, N. Y.

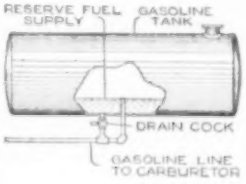
Ladder with Wheelbarrow Fixture for Repair Work

In making repairs on buildings and other structures, where many tools and, perhaps, a sawhorse must be transported to the job, a handy combination is a ladder-wheelbarrow, as shown. A wheel and axle from an old wheelbarrow are fitted to the upper end of a ladder used for repair work and painting. The tools and materials are packed on the ladder, which is wheeled in the usual manner.—A. M. Fairfield, St. Marys, Kansas.

The Ladder-Wheelbarrow Appeals to the Workman Who must Transport Tools and Materials

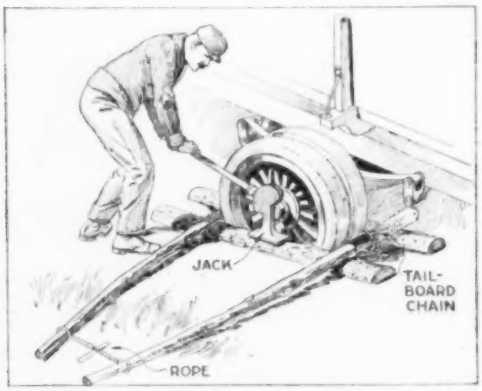
Special Outlet on Gasoline Tank Provides Reserve Supply

By installing a fitting into the gasoline tank on my automobile I avoid the unpleasantness of suddenly finding myself on the road without a sufficient supply of gasoline to make the supply station, at least. A special outlet was fitted into the tank so that ordinarily the gasoline is not drained to the bottom of the tank, leaving a reserve supply. In an emergency the tank is drained completely by the use of the extra valve at the bottom.—John Edwin Hogg, Alhambra, Calif



Makeshift Method of Lifting Auto Truck Out of Rut

A heavy auto truck became mired in a deep rut on a country road, and the



Wheel of Auto Truck Lifted Out of Deep Rut with This Makeshift Rigging

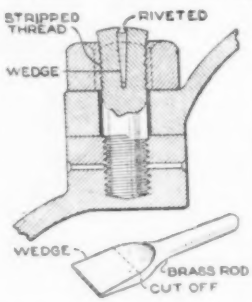
driver, without assistance and with only the auto jack available, was forced to devise some means of getting his machine again under way. The method employed was so simple and effective that it may be of interest to most motorists. Two saplings were set across slabs of wood, laid on either side of the truck wheel, as shown. The tailboard chain was rigged between the saplings just inside of the wheel. A tourniquet of rope was made with a small stick, and fastened to the free ends of the saplings. The jack was set under the rim of the wheel, and, as the latter was lifted, the tourniquet and the tailboard chains were drawn up to bring the saplings close against the wheel. By this means the wheel was gradually lifted out of the rut, and extra slabs placed under it so that the truck was then easily driven to solid ground. Slabs were also piled under the axle as a precaution, in case the wheel should slip back into the rut. —Edwin L. Purkess, Quincy, Mass.

Making Porous Battery Cups

Certain fluid batteries of the Bunsen or Daniell types require porous cups to separate the solutions used in making them. A good porous cup for this purpose can be made at small expense as follows: From heavy wrapping paper make a roll, the interior diameter of which is the outside diameter of the desired cup, and hold the roll in shape with string. Brush the inside of the roll with melted paraffin. Next mix plaster of Paris and water to a thick paste, set the roll up on a flat paraffined board, and pour sufficient plaster in to form the bottom of the cup, about ⅜ in. thick. While this is drying, cut a round piece of wood the size of the inside of the cup. When the bottom has dried, set the wooden piece inside the roll, and pour in the plaster. When set, remove the wooden piece and the outer roll. Cups of various sizes and shapes may be made by this method.—Thomas W. Benson, Philadelphia, Pa.

Nut Wedged on Stripped Bolt in Emergency

The threads of several stud bolts in the crank case of a stationary gasoline engine were stripped accidentally. Similar bolts could not easily be procured, and the following method was used to retain the nuts in place, as a quick repair: With a hacksaw, the ends of the bolts were split lengthwise to a depth of the thickness of the nuts. Wedges were made by hammering out the ends of a round brass rod. The nuts were placed over the bolts, and the wedges driven into the slotted bolt ends, expanding them when the nuts were forced up tight, as shown. The nuts were alternately screwed up and wedges driven in, until a snug fit was obtained. With the nuts finally in place, the ends of the bolts were riveted over the wedges to prevent them from loosening. To remove the nuts, it was necessary to drive out the wedges from the side.—G. A. Luers, Washington, D. C.

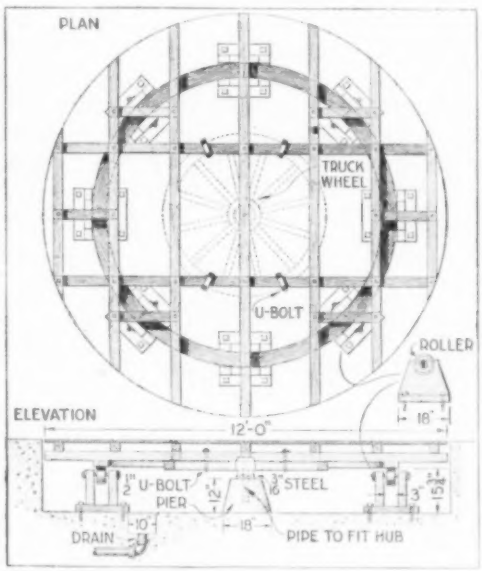


A Turntable for the Small Garage

By JOHN E. CAHILL, Jr.

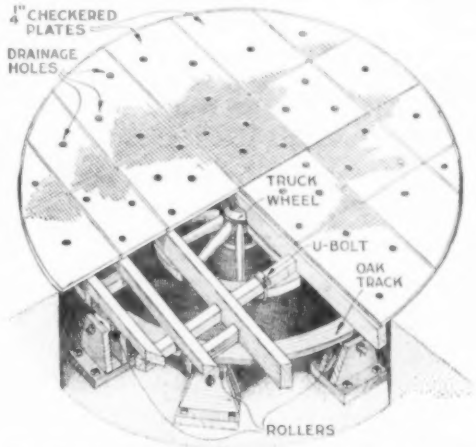
THE advantages of a turntable, especially for the small garage where space is quite limited, are apparent to many automobile owners, but the expense of installing one is usually considered prohibitive. Under these circumstances, the turntable shown in the illustration was designed, and proved comparatively easy to build and thoroughly satisfactory. The turntable was designed to be housed in the garage, and was built in a pit provided in the concrete floor. It may also be built in the open, or protected by a roof. Such a turntable in the garage is very convenient in washing the car, in making repairs, and in taking down the various parts, especially if used in connection with suitable overhead rigging for differential, or other heavy-duty pulleys and tackle.

The details of construction are shown in the plan and elevation views.



This Turntable for the Small Garage was Designed to be Built at a Minimum Cost, and Yet Provide a Substantial Construction

The general arrangement of the parts is shown in the sectional perspective view. The floor pit is built of concrete, 2 ft. deep and 12 ft. in diameter. It is fitted with a drainage pipe and outlet. A heavy truck wheel provides a center bearing, and is mounted over a pipe, imbedded in a concrete base.



The Framework is Built of Heavy Timber and the Turntable is Carried on Rollers, Bearing against a Wooden Track

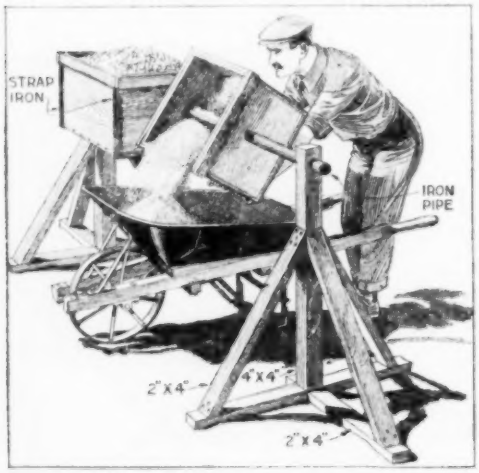
Steel washers, 3/16 in. thick, are set between the foundation and wheel, as bearings. The framework supported on the truck wheel is built up largely of 4 by 4-in. timber, with three 4 by 8-in. pieces, arranged as shown in the plan and bolted at the joints. U-bolts of 1/2-in. round iron, with clamping plates, fasten the main frame to the truck wheel. An oak track of 1 1/2 by 6-in. timber extends around the lower edge of the framework. The curve for this track is struck with a radius of 4 ft. 6 in. for the inner edge, and the segments are one-eighth of the circumference in length, approximately 4 ft. 8 in., allowing for trimming. This track bears on eight roller bearings, mounted on supports, as shown in the sketch, and detailed in the elevation. The rollers are 3 in. thick and 6 in. in diameter, of cast iron, and mounted on steel shafts, 1 1/16 in. in diameter, with cotter pins at the ends. The wooden supports are of 3-in. stock, and carry 3/4-in. pipe for bushings. The supports are bolted into the concrete.

The framework of the turntable, as originally designed and built, was covered with 1/4-in. checkered-surface plates of sheet iron, drilled with drain-

age holes. The plates were set to match on the 4-in. timbers, and fastened at opposite corners with screws, for easy removal in getting at the inner parts of the turntable. The floor may be made also of wood, arranged to be lifted in sections, when desired.

Tip Boxes Measure Concrete Materials Economically

In the mixing of concrete, the materials should be measured accurately if



The Measuring Boxes are Used in Batteries to Make Up a Properly Proportioned Batch at a Time

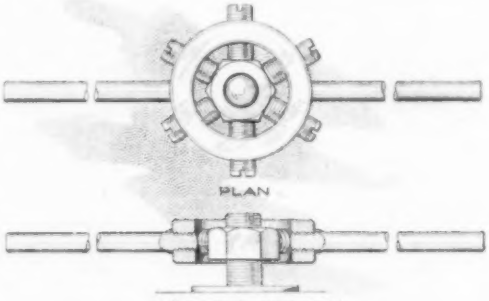
the best results are to be obtained. Sometimes the wheelbarrow, in which the materials are carried to the mixer, is used for a measure. To insure accuracy in measuring the materials and also a minimum of wasted time, the tip measuring boxes shown in the sketch were made. The boxes are made with the desired cubic capacity, and hung, above the center, on a 1½-in. iron-pipe axle. The boxes should be hung high enough to permit a wheelbarrow to be pushed under the bottom without interference. The supports are made of 2 by 4 and 4 by 4-in. pieces, strongly braced. The outfit may be dismantled quickly, and reassembled at another location, and the parts are of handy size for loading on a vehicle. In use, the shovelers fill the boxes, and the barrow men wheel their barrows under the boxes, which are promptly dumped. They are then filled again, ready for the return of the barrows.

Several boxes are usually desirable. For example, if a concrete of one part cement, two sand, and four stone is to be mixed, and each batch comprises 10½ cu. ft. of dry material, there should be six tip boxes: one 1½-cu. ft. box for cement, two 1½-cu-ft. boxes for sand, and three 2-cu.-ft. boxes for stone.

For each batch, the routine procedure of filling the battery of boxes, dumping their contents, and wheeling the material to the mixing trough is so simple that mistakes in proportioning the materials are not likely to occur.—Richard L. Nourse, Duluth, Minn.

A Novel Adjustable Wrench

A type of homemade wrench, which has a wide range of adjustment by means of screws set in a ring, as shown, was made as a novelty, and proved quite useful. Three of the screws can be used at a time for handling one size of hexagonal nut, and the others adjusted for another size. Two opposite screws will grip a square nut, and an octagonal nut can also be held tightly. The screws are loose enough so that they can be turned with the fingers, and are set when necessary



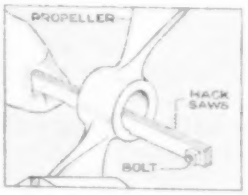
This Wrench, Made as a Novelty, Proved Quite Useful

with a screwdriver. In this way the wrench can be clamped to the nut.—J. Prophet, Pittsfield, Mass.

¶Sheet brass should be inclosed in a large wrought-iron pipe, closed at one end, when being annealed.

Keyway Cut in Bearing with Massed Hack Saws

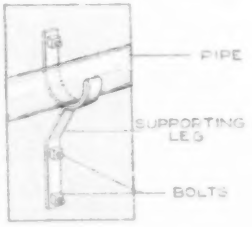
It is often a hard job to cut a keyway through a hollow bearing, even with the necessary tools at hand. Such a problem, and with few tools available, confronted a launch owner when the propeller loosened from its seat on the shaft, making it necessary to cut a new keyway and to reseat the propeller at once.



The work was accomplished satisfactorily. Several hack saws were fastened together, with the teeth all extending the same way, and held firmly by means of small bolts through the holes in the ends. Enough blades were assembled to make their thickness a trifle less than the width of the key. The propeller was then held in a vise, and the blades passed through the bearing, as shown, one end of the bunch being grasped in each hand. A new keyway was sawed, and the bottom smoothed out with the edge of a thin file.—Robert L. Binns, Denver, Colorado.

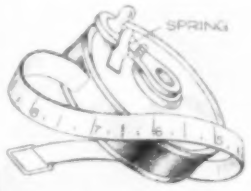
One-Piece Pipe Bracket of Strap Iron

A pipe bracket, for supporting pipe along the sides of buildings, walls, etc., can be made quickly from a single piece of strap iron, as shown in the sketch. It requires no bolts or rivets to make it retain its shape, and may usually be bent cold. Care should be taken to see that the supporting leg is directly under the pipe. The fastening through the supporting structure can be made with bolts or screws.—Roy H. Poston, Flat River, Mo.



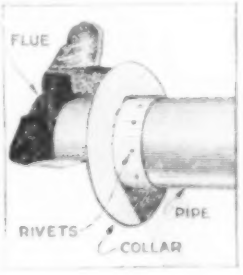
Spring Clip Locks Rolled Measuring Tape

The folding handle of a measuring tape had a tendency to unfold when other articles in the tool box came in contact with it, especially after it had been long in use. This caused the tape to unroll and to be in danger of damage when extending from the case. As a remedy, a small spring, shaped as shown, was fastened to the case. The handle is kept unfolded under the clip, which acts as a stop both when the tape is in use on the job, and when it is in the tool box. The clip folds against the case closely, and does not interfere with the winding of the tape by means of the handle.—Elmer O. Tetzlaff, DePere, Wis.



Riveted Stop Collar for Pipe Connection to Flue

Poor draft in the boiler or furnace is often due to a defective flue connection at the smokepipe. The stovepipe is sometimes set into the flue opening without a metal collar being secured to the end of it. The result is that the pipe jams into the flue and cuts off enough of the flue area to choke the draft. If the sheet-metal collar is riveted in place, as shown, it will prevent this slipping of the pipe. The connection to the flue should, of course, be kept down as far below the ceiling joists as practicable, but if it must be made close to them, the pipe should be covered with a suitable insulation.—Harold V. Walsh, Yonkers, New York.



An Electric Operation Recorder with Remote Control

By C. H. HOWARD

THERE are many applications for which an operation, or revolution, recorder, which may be actuated

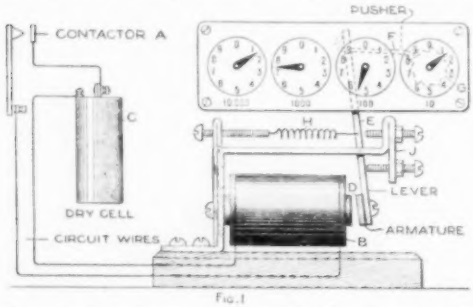


Fig. 1

General Arrangement of the Working Parts: The Recording Action on the Dials is Induced by the Completion of the Electrical Circuit, at Each Motion to be Counted

from a distant location, is desirable. The electric recorder, the arrangement of which is shown in Fig. 1, can be built to satisfy most ordinary requirements of this character, and is also simple in construction and operation. One of these recorders can be made easily, assuming that a movement, or gear train, like that shown, from a discarded watt-hour meter is available. Such a recorder may be adapted to count the number of revolutions made by a distant printing press or other similar mechanism; the number of times a door is opened or closed or the number of times a certain machine performs its functions. It may also be adapted so that it will count the number of turns of wire being wound on a spool or magnet.

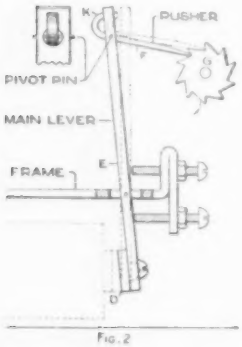


Fig. 2

The contactor A, shown in Fig. 1, is mounted on the device, the operation of which it is desired to record. The counter, with the magnet B and its frame, may be installed at any location within a reasonable distance from A. The circuit wires connect to the contactor and recorder, as shown. Whenever the contactor A is closed, current is circulated by the battery C around through the now closed circuit, thereby energizing the electromagnet B. The magnet draws over the armature D, which then, by means of the lever E and the pusher F, detailed in Fig. 2, thrusts the ratchet wheel G ahead one notch, thus indicating one operation.

The fine wire spring H, the tension of which may be adjusted at the supporting screw, pulls lever E back to its normal position when B is deënergized. Adjusting screws are provided to limit the movement of the lever E. All the parts of the device, with the exception of the magnet core, the armature D, and the frame J, which are of iron, should preferably be of brass. As shown in the detail, in Fig. 2, one end of the pusher F is bent around at K. This bent end forms a stop which prevents F from dropping down if its wedge end happens to be pulled back out of engagement with G.

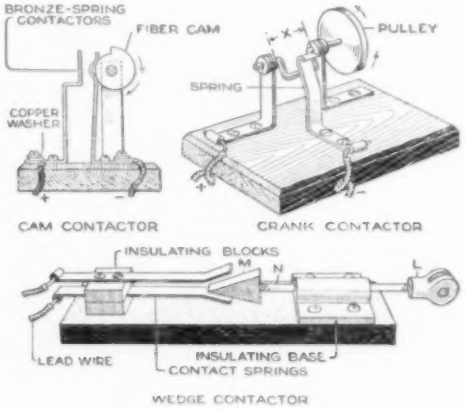


Fig. 3

Details of Three Contactors for Use in Making the Electrical Contacts in Recording Various Kinds of Operations

Contactors of various types may be designed for different services and locations. Some simple, effective designs are shown in Fig. 3. The cam contactor is mounted on the end of a shaft. Each time the shaft rotates, the fiber cam forces one phosphor-bronze spring into contact with the other, completing the circuit.

In the crank contactor, detailed in Fig. 3, each time the shaft makes a revolution, it wipes against the leaf contactor spring, and thereby completes the circuit of the recorder. The crank is turned by means of a pulley, which may be driven with a small belt from another shaft. The length of the crank between sides, at X, should be just a trifle less than the distance between the washers soldered on the bearing posts. Thus the longitudinal movement of the shaft will be limited, and no collars on it will be required. The washers soldered to the bearing post prevent the corners of the crank, as it turns, from striking the post. When an oscillating, or reciprocating, motion is to be recorded, a wedge contactor, as shown, may be utilized. The oscillating motion is communicated to the device by a connecting rod pivoting in the head L.

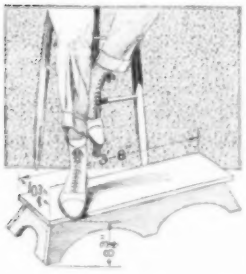
Each time the rod thrusts forward, the metal wedge M makes a wiping contact between the springs mounted above and below it. Insulation is provided by the fiber rod N. Where the service is severe, it is better to use a metal rod for N, with a connecting rod of insulating material, or a metal connecting rod with an insulating joint.

Letters on Machinery Chalked White for Photographing

In photographing machinery for the making of illustrations for catalogs and similar uses, it is usually desirable to have the trade-mark or manufacturer's name show plainly. When the name is cast on the machinery, as is usually the case, a simple method is to chalk the letters carefully so as to make them appear white in the photograph.

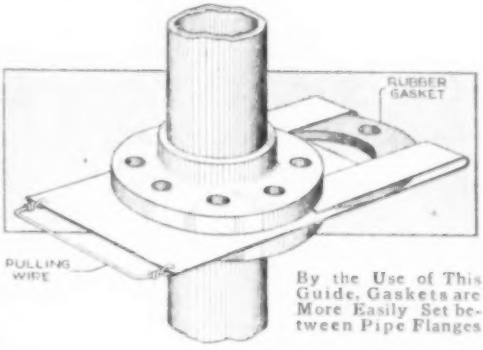
Nontipping Footstool Handy for Draftsmen

A footstool which proved popular with a large staff of draftsmen is shown in the sketch. It was designed with a wide base so that it is difficult to tip it over with the feet. This also avoids the noise of tipping the stool on edge and then dropping it. The wood used was ⅞-in. pine, and the footstools were stained and shellacked. The dimensions shown were found satisfactory, but may be varied for special needs. In making large drawings, the men find this stool especially convenient.



Device for Setting Gaskets in Pipe Joints

Replacing rubber or other gaskets on flanged pipe joints is often a tire-some job. To facilitate this work, I made a tool of light-gauge sheet metal, cut to the shape shown in the sketch and bent to hold the rubber gasket at one end. The projecting ends of the piece of metal are folded back over the gasket, and act as guides in sliding the gasket into place. These strips are sprung sidewise after the gasket has been set with a bolt at the open end of the guide. The latter is then drawn out without disturbing the position of the gasket.—A. J. Cohen, Brooklyn, New York.

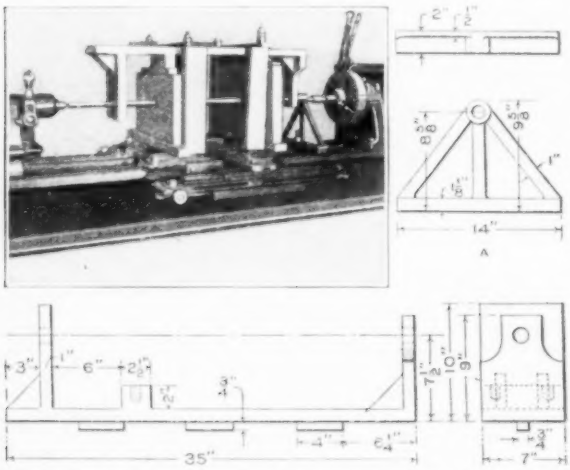


By the Use of This Guide, Gaskets are More Easily Set between Pipe Flanges

¶Glass should not be fitted too closely in a picture frame, to allow for expansion.

Unusual Boring Job Done on a Lathe

An unusual set-up for a piece of machine work, and an illustration of what may be done on a lathe, is shown in the photograph and the sketch. The job to be made is part of a jig, which required that the hole in each end be bored in line and true to size. The



When Only a Lathe Was Available for a Special Boring Job, This Rigging was Set Up, and Accomplished the Work

only machine available for doing the work was a 16-in. lathe. A guide, A, was made for the boring bar. It was not possible to rest the work directly on the saddle, so it was blocked up and clamped down, as indicated. Two cutters were placed in the boring bar, and the work was finished in a short time. A universal joint was used in the center, so that the movement of the bar would not be irregular, even though it might not line up precisely with the centers.—Harvey Mead, Scranton, Pa.

Conical Fire Buckets Seldom Misused

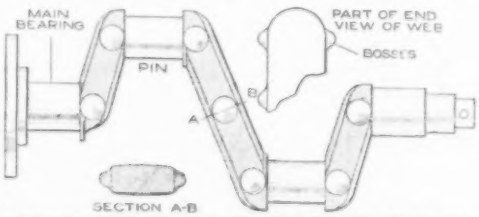
In a large plant where fire protection is essential, various methods of preventing the use of fire buckets for other than their intended service were tried without success. Finally, pails of about the usual capacity and conical in shape, with a sharp point at the bottom, were installed. These proved satisfactory, as the possibility of their misuse for other purposes is limited.

Patching Worn Guides in a Wooden Miter Box

A superior method of closing worn-out cuts in a wooden miter box is to cut thin slices of end grain out of the same dimension stuff as the sides of the miter box, and to glue these into the cuts. Cut these slices in the miter box to a thickness which will permit them to slip easily into the cuts they are meant for. With a piece of tin, apply glue to the inner surfaces of the cut, allow it to soak in, and apply more, using plenty. Slip in the filler and allow it to dry. When the glue is set, a new cut is made within ⅛ in. of the old one, or the new cut can be made to run through the old one at an angle. The life of the miter box can in this manner be lengthened considerably, and the new cuts will give good service if carefully made.—Henry Simon, Laguna Beach, Calif.

Crankshafts Ground to Balance without Weakening Them

In order not to weaken crankshafts by grinding them at certain points so that they balance properly, small rounded knobs, or bosses, were provided on the shaft, as shown in the illustration. The crankshafts could thus be easily balanced by grinding the



The Small Bosses on the Crankshafts Make It Convenient to Grind Off Excess Metal to Produce the Desired Accurate Balance

bosses at the points where excess weight was to be removed.

Hacksaws Do Better Work When Properly Selected

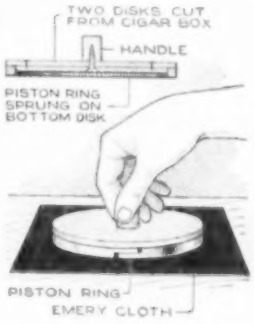
Hacksaw blades do smoother work and wear longer if oiled, and especially if a saw of the proper type is selected for the work in hand. Proper hacksaw practice is quite commonly neglected in machine and repair shops where hurry-up jobs are always in order. Considerable time can be saved, and better work turned out, by keeping frames fitted with 14, 18, 24, and 32-tooth blades in the tool room, instead of providing only coarse blades.

A Painter's Folding Easel Made of Flooring

A painter's and showcard writer's easel, substantial and practical, can be made from tongue-and-groove flooring. Saw the strips of flooring in halves, lengthwise, and make the large frame of the grooved pieces. If narrow flooring is used, it need not be ripped, the tongue being cut off the strips for the large frame, and the grooves from those for the small one. Make the small frame of the tongue sections, as shown, to fit loosely and slide up and down in the grooves of the large frame. Fasten a screw eye at the top of the large frame, and one in the top of the small frame, and tie a stout cord to the eye in the latter, running it through the eye in the large frame. Nail a strip of wood to the back of the frame, and on this hinge the supporting strip. By pulling on the cord, the small frame is raised and lowered. The canvas, or card, is placed on pegs in the small frame, or a suitable trough may be provided.—E. A. Hoppman, New York, N. Y.

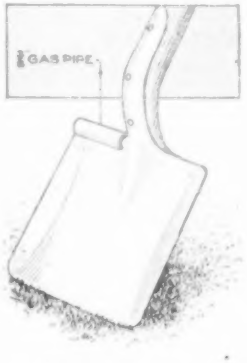
Device for Grinding Oversize Piston Rings by Hand

The automobile owner who frequently tinkers with small repair jobs, as well as the gasoline-engine mechanic, will find this kink in the grinding of oversize piston rings a handy one. The work should be done very carefully, and the method sometimes employed of rubbing the ring on emery cloth, the ring being held with the hand only, is not efficient. The device shown was made of two disks cut from cigar-box wood, and fastened together with a screw set in a small handle. The ring is sprung onto the bottom disk, and is in convenient position for accurate grinding on a sheet of emery cloth laid on a flat, hard surface, preferably a polished metal plate. —G. Brown, Chicago, Ill.



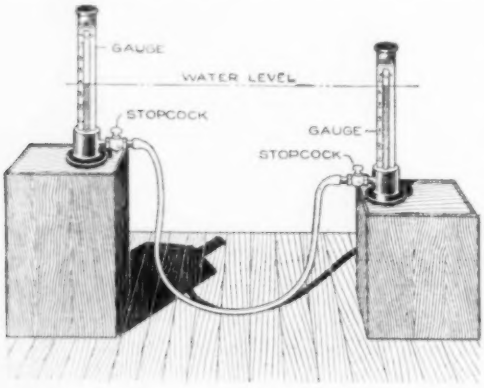
Shoe Guard for a Shovel

A shoe guard for a shovel which will be appreciated especially by the many women gardeners who are practicing war-time economies, can be made by fitting a short length of gas pipe tightly over the upper edges of the spade or shovel. The pipe is cut to the proper length as shown, and then sawed open on one side. By spreading it properly and springing it onto the shovel blade, it will stay in place without special fastening.—Marie C. Moore, Seattle, Washington.



Homemade Water-and-Tube Level Indicator

The homemade instrument shown in the illustration is useful for finding levels at long distances, over obstruc-



The Glass Gauges are Mounted on Standards Set into Suitable Pipe Flanges and Capped with Metal Fittings

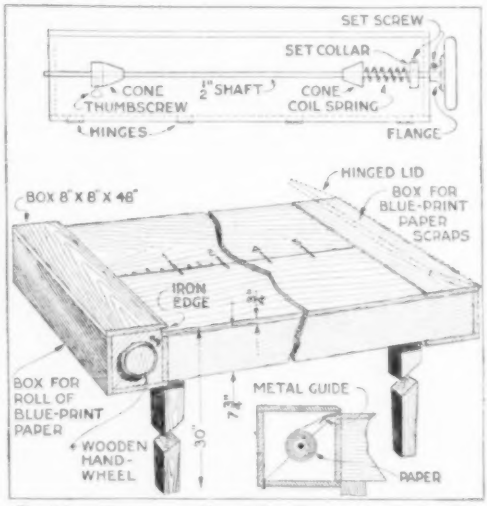
tions or around corners, and for lining up shafting, etc. It indicates that points are out of level, and also shows in inches how much they are out of level. When leveling two points, a gauge is placed on each, as shown. The stopcocks are opened, and when the water comes to rest, closed again. The apparatus may then be lifted up, and carried to the light, if necessary, and the exact position of the water-column height determined on the scales. About 10 per cent of glycerin added to the water before filling the level will ordinarily prevent it from freezing. If accidentally the stopcocks should be left open, little float valves, located in the cups at the top of the gauges, close the vent holes automatically when the water level rises to them. This avoids the annoyance from overflow of the liquid.

Enlarging Dials on Machine Produces Closer Work

In handling an exceptionally accurate job of tool making on a milling machine, it was found that the usual dials did not give the accuracy required. Dials, 12 in. in diameter, were made, with the same graduations as the corresponding ones on the machine. These were set over the machine dials very carefully, and used in place of them. Suitable indicating fingers were made to fit the dials where needed, and by this means extreme accuracy was obtained. The dials proved so useful that they were preserved for other jobs. The same method can be applied on a number of other high-class shop machines.—Otto S. Anderson, La Vina, Calif.

Case at End of Table for Blueprint or Drafting-Paper Rolls

An arrangement which is useful and economical for the drafting or blueprint room is a table with special cases at the ends to contain the rolls of paper and the pieces trimmed off but still useful. The top of the table is marked off in indications for measuring the length of the sheet, which is torn neatly at the iron edge of the box containing the roll of paper. The roll is supported on an iron shaft having a spring



Drafting Papers are Cared For Economically by This Outfit, and the Sheets Cut Neatly and Quickly

and cone device, as detailed, to hold the roll. A metal guide, as shown in the sectional view below, starts the edge of the roll through the slot, when the handwheel is turned to unwind the roll.

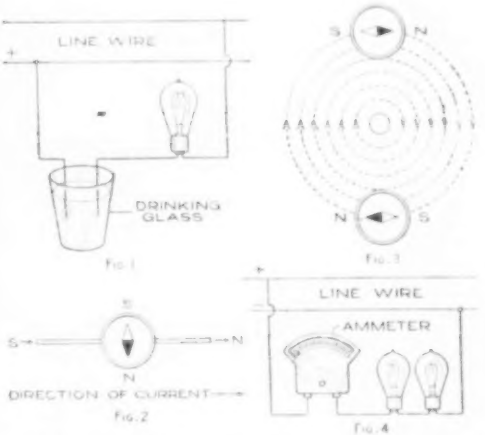
Methods of Testing the Polarity of Line Wires

When installing electrical machinery it is often necessary to locate positive and negative sides of a circuit before a piece of apparatus can be connected. A simple test, for other than high-potential circuits, is shown in Fig. 1, which represents the ends of two wires, one from each side of the circuit, placed about 1 in. apart in a glass of salt water. A suitable resistance, such as one or more lamps, is placed in the circuit. Bubbles arise from each of the terminals. That from which fewer bubbles arise is the positive wire.

The compass test, shown in Fig. 3, is based on the action of the magnetic lines of force, set up around a wire carrying current, upon a magnet placed in the vicinity of the conductor. The conductor is represented perpendicular to the plane of the paper with the current flowing "down," or away from the observer. A compass needle placed in the magnetic field will tend to assume the position shown, its north pole pointing in the direction of the lines of force set up by the current in the conductor.

This test can also be made on a horizontal conductor. Select a part of the wire that is placed, or can be bent, in an approximately north and south direction. Place the compass directly over the conductor, as indicated in Fig. 2. If the current in the conductor is flowing from south to north, the north pole of the compass will be deflected toward the east, and the reverse.

A small reading ammeter in series with a suitable resistance can be used to determine the polarity, as shown in Fig. 4. In order to obtain a proper deflection of the meter needle, the positive ammeter terminal must be connected to the "plus" side of the circuit, and the negative terminal to the "minus" side of the circuit. If the connections are reversed the needle will be deflected in the opposite direction until its further progress is barred by a stop, or by the side of the case. It is well in this test to use enough resistance in series with the ammeter so that the current through the meter

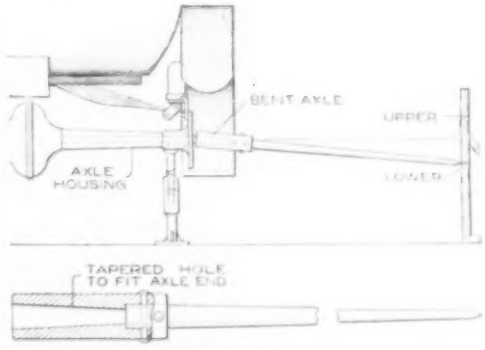


Four Simple Tests to Establish the Polarity of Wires in Electrical Installations

will be small. Permitting a large current to flow through the instrument in the reverse direction may harm it by bending the needle.—Peter J. M. Clute, Schenectady, N. Y.

Straightening Bent Automobile Axles

A method of straightening bent automobile axles, used by a local repair shop with the best of results, is shown



With This Tool, the Work of Straightening the Axle can be Done without Dismantling the Car

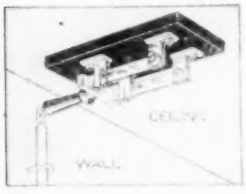
in the sketch. The straightening tool is 6 ft. long, drilled with a tapered hole to fit over the axle end. A solid bush-

ing, of the exact size of the roller bearing in which the axle shaft revolves, replaces the roller bearing during the straightening process.

The procedure for straightening is as follows: The axle being jacked up, the straightening bar is slipped over the tapered end of the axle, and held, to prevent it from turning. The axle shaft is revolved by turning the starting crank of the engine with the clutch engaged. An upright board is placed at the extremity of the pointed end of the bar, as shown. The high and low points to which the turning axle moves the pointed end of the bar are marked on the board. The intermediate point of these two positions is measured off, and by pressure on the end of the bar, the axle is sprung back until the pointed end comes to this place. Great care should be taken that the sleeve grips solidly, when the axle is straightened.

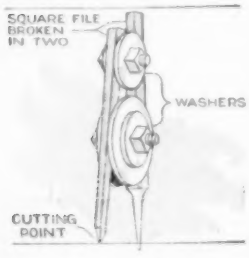
Electric Switch Mounted on Ceiling for Safety

An electric grinder was installed in a 440-volt circuit, and we wanted the switch in a safe place where there would be no danger of anyone accidentally touching it. The switch was, therefore, rigged on the ceiling and a control device was made for it so that the current could be shut off, or turned on, conveniently at the wall. The lever device shown in the sketch has sufficient play for the switch to open and close, and is operated by sliding the vertical bar up or down.—C. Anderson, Worcester, Mass.



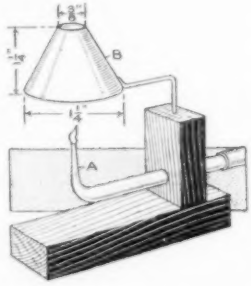
Makeshift Tool Cuts Round Holes in Sheet Metal

A hole was to be cut in the metal dash of an automobile, and no cutter of the usual type was at hand. I devised a substitute tool in a few minutes from an old square file, washers, and two bolts. The file was ground to a sharp point at the tang, and to a cutting point at the other end. It was then broken at the middle and the parts clamped together, as shown. The device was used like a compass, and cut a clean hole in the metal.—G. I. Mitchell, Ruston, La.



A Small Blowpipe Torch without Compressed Air

It is often desirable to obtain a higher temperature than the ordinary gas jet or the Bunsen burner will give, where a source of compressed air is unavailable. A simple burner, arranged as a small blast lamp, is shown in the sketch. By its use, such work as glass-blowing and welding may readily be accomplished. The part A is a portion of a common blowpipe, or may be any similar tube with a tiny outlet in the tip. This blowpipe is connected to the gas supply by rubber tubing, and mounted as shown. A conical hood, suitably supported, is placed above the jet, and acts as a mixer and burner. By adjusting the hood, and thus the draft, the flame may be varied from a small hot point, above B, to a broader tip and an intensely hot region just below the mouth of the mixer. The best adjustment can readily be determined by trial. After the funnel becomes hot, it keeps the heat in and cuts off radiation.—R. D. Rusk, Niles, Ohio.



An Automatic Warning Gong for Vehicles

By EARL W. DAVIS

A GONG which will sound its alarm, whenever the vehicle on which it is mounted is in motion, is often desirable. Such a gong is detailed in the illustrations. Advantages of this arrangement are its simplicity, and the fact that it is self-contained. Also, the frequency of the gong strokes is proportional to the speed of the vehicle on which the gong is mounted. Thus, when the vehicle carrying the gong is invisible, the listener can judge of the rapidity of its approach. This is of importance in locations which are dimly lighted, in mines, or in dark corridors in industrial plants. Some of the applications for this automatic alarm are on trucks in factories, on monorail telphers, cranes, mine locomotives and cars, and turntables.

As indicated in Fig. 1, the automatic gong is attached to one of the wheels of the vehicle. As the wheel completes a rotation the gong sounds once. At each rotation the steel ball within the tapper cylinder drops against the tapper, making the latter strike the gong. A spring returns the tapper to normal

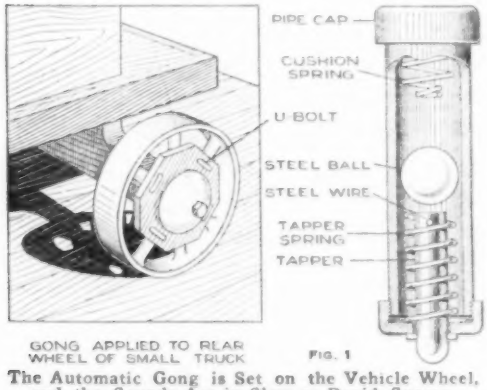


FIG. 1

The Automatic Gong is Set on the Vehicle Wheel, and the Sounds Are in Slow or Rapid Succession According to the Speed of Travel

position, for the next stroke. In the assembly view, Fig. 2, the relation of the parts are shown. The assembled tapper cylinder A is mounted within the gong B. A yoke, C, of strap iron, holds the device to the board D, by means of screws. The cap screw E, passing through the hole in the gong and turning into a tapped hole in the yoke, clamps the gong in position. A washer, F, is provided between the yoke and the gong so that the gong lies in the correct location to receive the blows from the tapper. Spacing blocks may be inserted to raise the

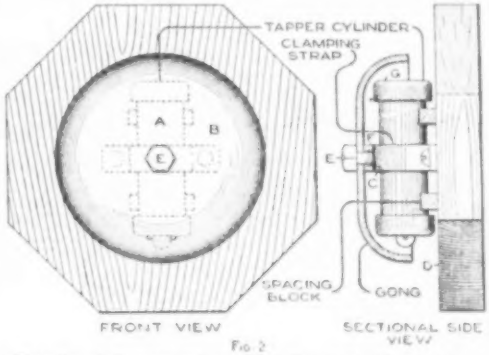


FIG. 2

Details of Construction: The Gong is Mounted on a Board and Houses the Operating Mechanism

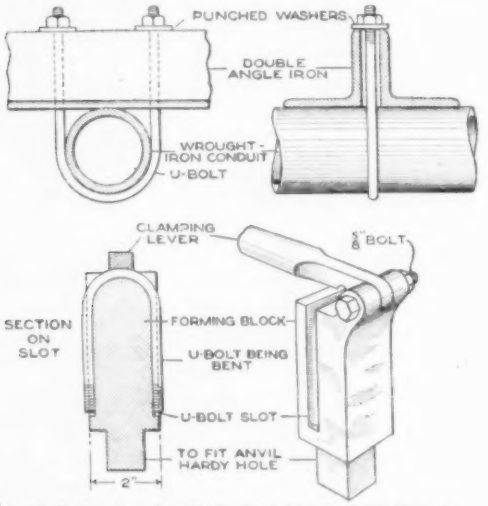
tapper cylinder from the mounting board. This board, with the device on it, is clamped to the vehicle wheel with U-bolts, as shown in Fig. 1. For severe service, mount the gong on a square steel plate, and bolt this to the wheel.

The detailed construction of the tapper cylinder is shown in Fig. 1. A wrought-iron nipple provides the body, which is fitted with malleable-iron pipe caps. One of the caps has a hole drilled through it to accommodate the tapper. Two drive-fit steel-wire pins in the tapper act as stops. The ball is of the usual ball-bearing type. If a bearing ball is not available, a rounded piece of iron will serve. The spring is of No. 14 gauge brass wire, for the average case. The spring returns the tapper after the ball has struck, and holds the tapper in position against the centrifugal action. A cushion for the ball on the rebound is provided by the spiral spring, of No. 18 gauge wire. Experimentation may be necessary to adjust the parts to best advantage for individual installations.

¶Outer corners of machine parts are often rounded slightly because sharp corners become nicked easily.

Practical Uses for U-Bolts and Rig for Forming Them

Round wrought-iron U-bolts can frequently be employed to excellent advantage as clamps, in piping or in conduit-wiring installations in steel-frame buildings, and for many other



U-Bolts Can be Made Quickly and Uniformly by the Use of This Device

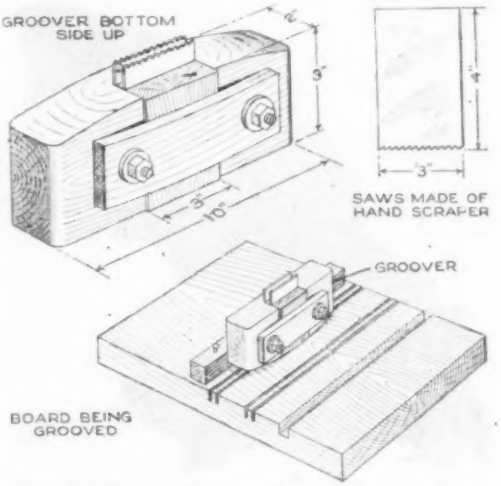
purposes also. A typical method of using a U-bolt for this service is shown in the illustration. The pipe, or conduit, is clamped to a steel member with a U-bolt, between two mild-steel angles. U-bolts for the smaller-sized tubes can be bent cold and formed around a piece of pipe conduit of the correct diameter. The threads should, of course, be cut on the rod before it is bent.

Where U-bolts are required for tubes of larger diameters, it is not practicable to bend them cold. If many U-bolts of the same size are required, particularly in industrial-plant installations, it will pay to construct a bending rig like that shown. This consists of a block of wrought iron in which is cut a groove form. A hinged lever at the top of the block holds the bolt while it is being bent. On the lower end of the block is a square extension, to fit the hardy hole of an anvil.

In using the rig, the wrought-iron rod is heated to a cherry-red, and then held at its middle point in the rig between the lever and the forming block. Pressure on the lever will hold the piece of stock in position. Then, with a wooden, or lead, mallet, the ends of the rod are pounded down to shape.—R. C. Frank, St. Louis, Mo.

A Rabbeting and Grooving Tool of Wide Use

In getting out a job which required the making of a large number of grooves and rabbets of various sizes, across the grain of the boards, I saved much time by making a simple grooving and rabbeting tool, which was well worth while keeping as a handy device. A piece of hard wood, 2 by 4 by 10 in. long, was shaped as shown in the sketch. The lower edge was curved slightly so that grooves could be cut in somewhat concave surfaces. One side of the block was gained out and fitted with blocks to hold the cutters. These were made of soft steel, filed with teeth as detailed. A strip of wood, fastened with screws, clamps the cutters and cutter blocks into



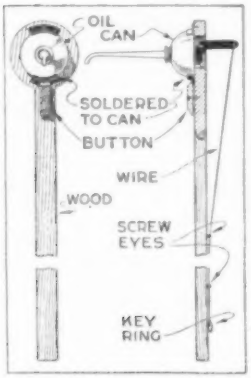
The Saw-Tooth Cutters are Set to the Proper Width and Depth, and a Strip is Used as a Side Guide

place. By providing a set of cutter blocks, the cutters can be set at various standard widths, and, for odd sizes, special blocks can be made

quickly. The lower sketch shows the tool in operation, one of the grooves being routed out, and the others having the kerfs as cut by the tool.—Herman F. Zimmerman, Los Angeles, California.

Oilcan Mounted on Pole for Oiling Overhead Bearings

An ordinary long-spout oilcan, with a spring bottom, was mounted on a pole fitted with a device for pressing the bottom, and proved very useful in a shop where many overhead bearings were to be oiled.



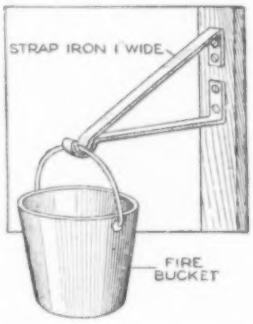
The arrangement is, of course, not practical for oiling loose pulleys and similar machine parts, but has a wide range of use otherwise. The supporting rod is shaped as shown, and the can is held in place by a metal clip at the top, and a button at the lower end. The button engages a small metal angle soldered to the can. This arrangement makes it easy to remove the can for filling. A metal angle is set in a mortise through the pole at the bottom of the can, and this device, controlled by a wire threaded through screw eyes, acts like the thumb in pressing on the bottom of the can in ordinary use.

Gilding on Bare Wood

For gilding on bare wood, use a size made by mixing a small quantity of white wax, a little white soap, and a few drops of Venice turpentine. Permit this size to remain for about an hour, and lay the gold leaf upon it in the usual manner. It will take a very satisfactory burnish.—A. A. Kelly, Malvern, Pa.

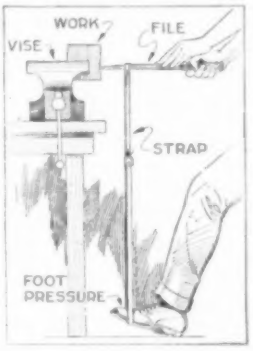
Strap-Iron Hanger for Fire Buckets

The common type of support for fire water buckets, with the shelf and brackets underneath, is objectionable and often inconvenient. A type of hanger that is easily and inexpensively made is shown in the sketch. It is bent cold, or forged, from ⅛ by 1-in. strap iron, or material slightly heavier if the buckets are large. It is fastened to the wall with screws or bolts, and gives proper clearance for the bucket, used only for its proper purpose.



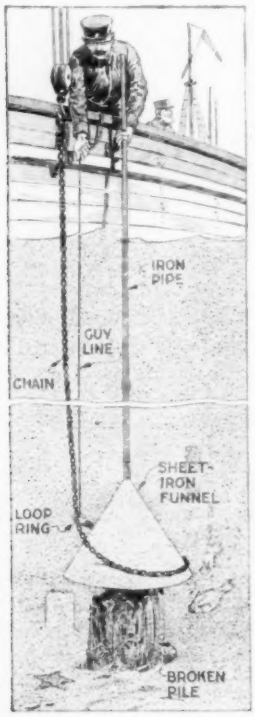
Foot-Pressure Strap an Aid in Filing

A considerable quantity of castings were made with a "blind" square opening in one side. These openings had to fit a gauge, and, due to defects in molding, they sometimes needed much filing. To file such a part is slow work, and tiring, the filing being done entirely on the point of the file. An ingenious arrangement by which this work was made easier is shown in the sketch. A leather stirrup for the workman's foot was attached to the file near the point end. As soon as the file is placed in each casting, the workman presses on the stirrup, exerting a pressure on the file greater than could be applied by hand, and at small effort.—D. A. Hampson, Middletown, New York.



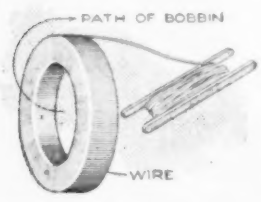
Funnel Device for Lifting Submerged Piles

When submerged piles from piers, foundations, or other structures, are to be removed, the services of a diver are usually necessary. In a job of this kind, where a number of piles broken off by the waves in a fishing ground, were to be raised, an ingenious device was used, and the piles brought to the surface without sending down a diver to adjust the chains. A large sheet-iron funnel was fastened to an iron pipe, as shown. The funnel was set over the pile, with the hauling chain looped over it. The chain was dropped into place, and the funnel withdrawn. The pile was then lifted by means of a powerful hoist.—Henry K. Pasma, Oostburg, Wisconsin.



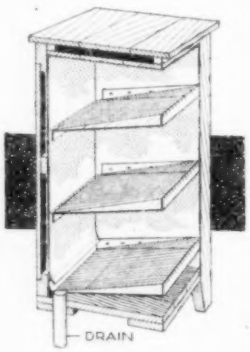
Special Bobbin for Winding Wire on Rings

Shops in which much electrical work is done will find a special bobbin for holding the wire of great value as a labor and timesaver. For such work as winding wire on small rings, the bobbin should be long and narrow, as shown in the sketch. The wire supply is wound on the bobbin, and during the process of winding, the latter is passed through the ring, around and through again, until the work is completed. This method avoids twisting and kinking of the wire.



Convenient Rack for Drying Laboratory Glassware

Space economy and better drying facilities for laboratory glassware are features of a newly designed, home-made rack in use in a dairy chemical laboratory. The frame of the rack is a wall case with open front, of convenient size. The interior rear wall of the case is covered with galvanized sheet iron, and the shelves are made of similar material. They are supported at the ends to slope toward the back. A small space is left between the shelves and the back of the case. The front and rear edges of each shelf are bent at a right angle, to make it rigid. Galvanized wire cloth forms the surface on which the glassware is inverted, after washing. The drip from these dishes runs to the shelf, and thence down the rear lining of the case to a shallow metal tray at the bottom shelf of the case. This tray is inclined toward a drain, as shown. No drip from the dishes on one shelf reaches those on the shelves below.



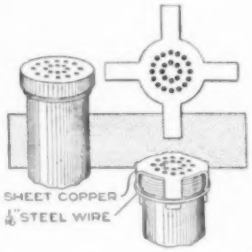
Electric-Light Bulbs Painted Black as Substitute for Shades

Switchboard lamps, and other lamps that are in a fixed position for reading instruments such as ammeters, voltmeters, etc., or where a permanent light is desired, may be shaded by painting half of the lamp black with ordinary black paint, or black shellac,

instead of using the customary pear-shaped shade and reflector.—P. H. Roy, Kansas City, Mo.

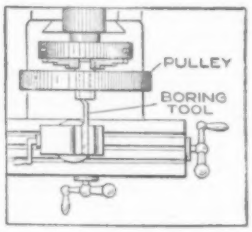
Breather Cap for an Automobile Engine

The losing of a breather cap on an automobile engine made it necessary to replace the cap quickly. A piece of sheet copper, 1/16 in. thick, was softened by heating, and permitting it to cool in the air. It was then cut to shape, as shown in the sketch. The small holes were drilled, and the four projections bent over the pipe in such a manner that they pressed tightly when the cap was in position. The ends were bent back a trifle to make it pass over the threads easily, and the cap was polished on a buffer. To prevent the cap from coming loose, a lock ring, of 1/16-in. steel wire, was applied.—Adolph Klein, New York, New York.



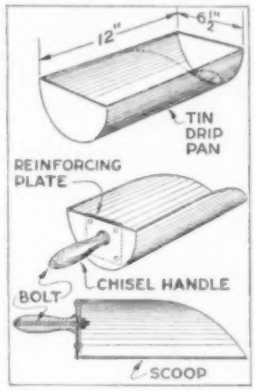
Milling Machine Set Up as Boring Mill

One of the special uses to which a milling machine may be put is as a boring mill. A job came in to our little shop: a pulley too large to swing on our largest lathe. The pulley was to be bored out and a bushing fitted in it. I chucked the pulley up on the milling machine, ran the table out, and placed on it the vise, into which I clamped a boring tool, as shown. I also turned up small chuck work, as well as work between chuck and center, and while it is not quite as handy as a lathe, yet it is a convenience in a "pinch."—Joe V. Romig, Allentown, Pa.



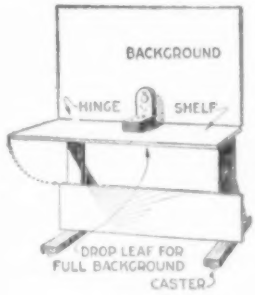
Strong Hand Scoop Made of Drip Pan

When a strong scoop was needed for use in the shop, it was found difficult to shape one with the tools and materials at hand. A large, unused oil drip pan from a shaft bearing was obtained, and easily converted for the purpose. One end was cut out and the sides shaped as shown. A reinforcing plate was riveted into the other end, and an old chisel handle was bolted through the end and the plate.—P. P. Avery, Garfield, N. J.



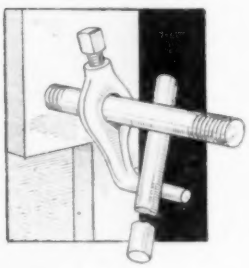
Photographic Background with Folding Shelf for Small Objects

Backgrounds for photographic work are often made by stretching white canvas over a wooden frame. These frame backgrounds are light, and when there is much photographic work to be done in a factory, or shop, heavier construction is required. A 4 by 6-ft. white background used in a large factory is shown in the sketch. The board proper is of 1-in. stock, mounted on standards. The lower section is hinged to the upper section, as shown, and suitably supported. Thus, when machinery is photographed on the floor, the full background is used, and when small objects, such as automobile accessories or electrical devices, are photographed, the shelf is used.—K. M. Coggeshall, Webster Groves, Mo.



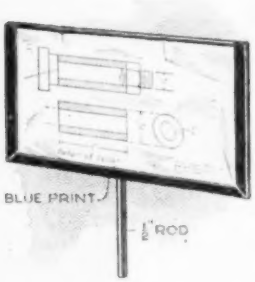
Heavy Stud Bolts Removed with Lathe Dog and Lever

Machinists sometimes find stud bolts set so firmly that the ordinary wrenches and devices for removing them are insufficient. Under these conditions, a simple method is to attach a heavy lathe dog to the bolt, as shown, and apply an iron bar as a lever. Tremendous force can be applied in this way, and the bolt easily removed. By reversing the pull, the bolt can be set very firmly.—W. Ichler, Kansas City, Mo.



Blueprint Holder on Machines Aids Efficiency of Machinist

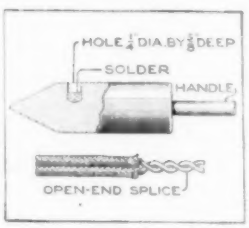
For the convenience of machinists, as well as an aid in keeping the work orders or blueprints clean, holders for them were made and placed on each machine and bench in a large shop. A rectangular section of sheet iron, slightly larger than the standard size of drawings employed, was bent to have three of its edges turned over to form a ½-in. border, as shown in the sketch. A strip of iron, ⅛ by ½ in., and of the necessary length, was riveted to the holder, at one end, and the other was fastened to the machine, or to a suitable portable base. The blueprint, placed in the holder, is thus always at hand, and well protected from dirt and the usual wear.—S. A. Groves, Minneapolis, Minn.



¶ Pure turpentine dropped on a piece of white paper and exposed to the air, will leave no trace of foreign matter.

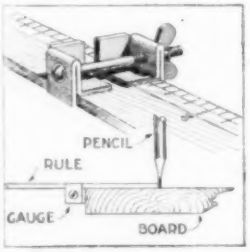
Soldering Iron Improved for Joining Splices

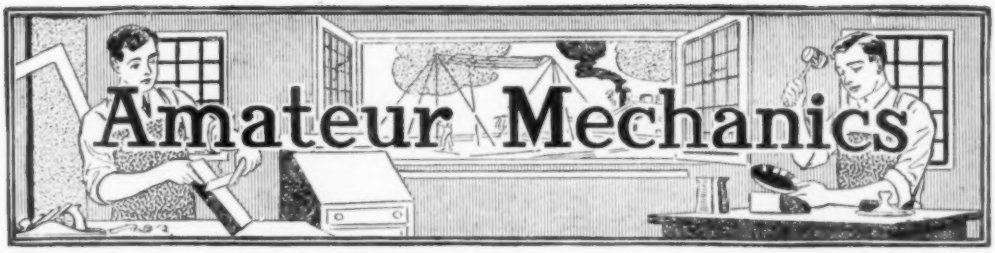
An improvement which can be made to any soldering iron, and which will prove very convenient, is shown in the sketch. A hole, ¼ in. in diameter and ⅝ in. deep, is drilled in the side of the iron and filled with solder. It is a timesaver for rapidly soldering twisted-wire joints. In this manner splices of the open-end variety may be made with much better results than by using the tip of the iron for soldering. The iron is heated until the solder in the hole melts, and then the splice, covered with soldering paste, or acid, is dipped into it. This makes a well-soldered joint in a remarkably short time.—P. J. M., New York, N. Y.



Adjustable Gauge for Rule or Straightedge

A favorite method of gauging, especially in rough work, is to use the end of the ruler, with the hand or fingers as a guide. A similar but better method is to fit the ruler with a homemade gauge, which clamps securely and quickly by means of a bolt and wing nut, as shown. The gauge is bent from two strips of sheet metal, each laid out flat in the shape of a right angle. The short ends are folded up and the longer ends are folded double, and holes for the clamping bolt are bored through the folded parts. The lower ends of the strips, at these folds, grip the edges of the rule, when the wing nut is set.—C. C. Spreen, Flint, Mich.



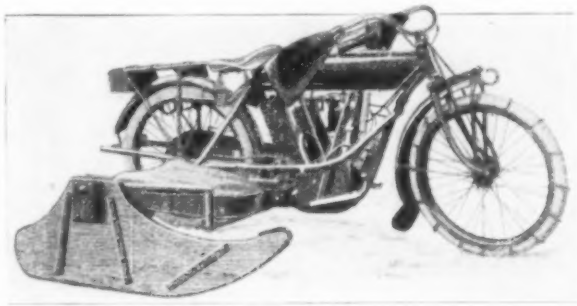


Sled Sidecar for Motorcycle

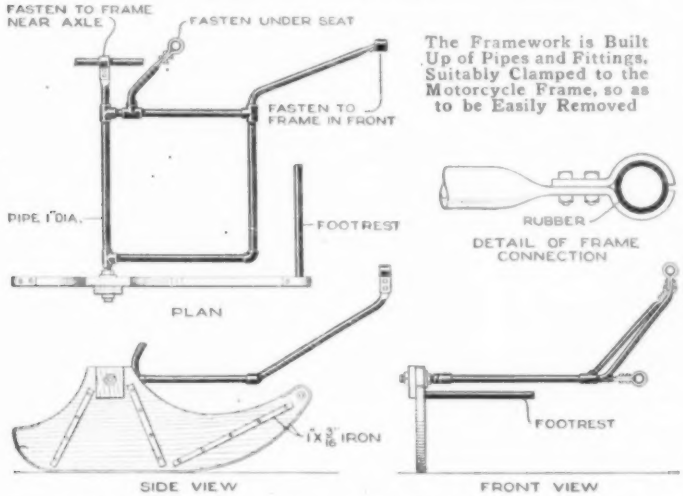
By A. F. KRUEGER

THE motorcycle need not be laid up when snow and ice come, for it can easily be fitted with a practical sled sidecar that is nearly as useful in winter as the usual sidecar in summer, and which has, in addition, an element of novelty. The photograph and sketch show a sled attachment that is handy to carry a passenger, or other load, and which helps balance the motorcycle when making short turns on icy pavements.

The construction is simple, and the detailed sizes vary with special installations. The runner proper is made of hickory, oak, or other hard wood. It is shod with 3/16 by 1-in. band iron. That of semioval section, fastened with countersunk screws, is preferable.



By Replacing the Motorcycle Sidecar with a Sled Attachment, Invigorating Winter Sport is Afforded the Motorcyclist

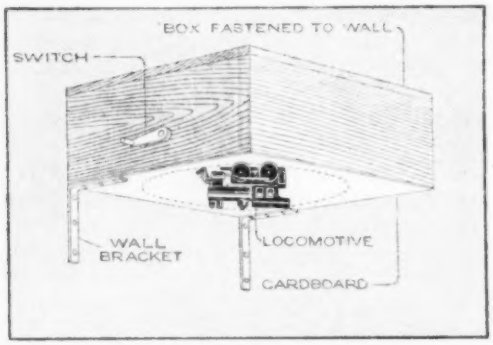


The Framework is Built Up of Pipes and Fittings, Suitably Clamped to the Motorcycle Frame, so as to be Easily Removed

Both sides of the runner are reinforced with 3/16 by 1-in. band iron and 1/4-in. stove bolts. The axle that carries the seat is made of 1-in. diameter pipe, threaded and locked at the runner with a jam nut and washers. The axle passes under the seat and is fastened to the motorcycle frame. Fastenings similar to those used to clamp the ordinary sidecar on a motorcycle are used as detailed. A padded seat is fixed to the frame. A footrest, in the form of a pipe extending from the nose of the runner to the motorcycle frame, may be added. A handle of pipes, on each side of the seat, is a convenience to the passenger, when riding on rough roads. The cushion seat is strapped to the supporting bars. A sidecar body, of the "boat" type, or a homemade parcel carrier, may be built to replace the passenger seat.

Trick Locomotive Runs Upside Down

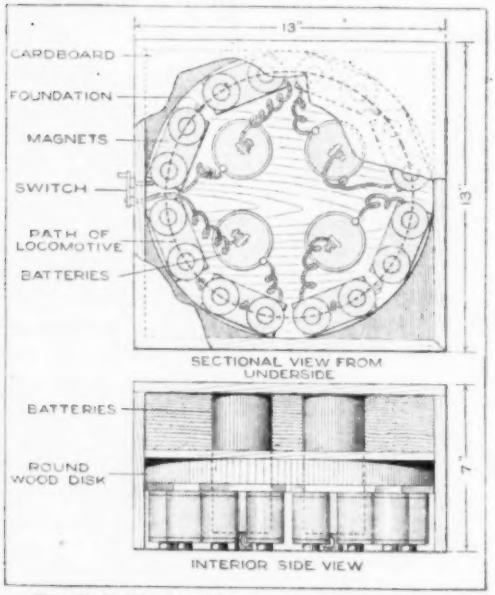
An interesting piece of experimental construction that proves a novelty and source of amusement to visitors is contained in an innocent-looking box fas-



The Small Locomotive Runs Around on the Underside of the Box in a Circle, Mystifying the Onlookers

tened to the wall by means of brackets. In preparing a friend for a surprise with this outfit, I show him a small locomotive which runs by a spring. This toy always attracts attention when it is playfully run around on a table top. I then casually set the locomotive on the underside of the box, as shown in the sketch and release it. Instead of falling to the floor, it runs in a circle on the lower side of the box, much to the amazement of uninitiated onlookers. After much guessing as to the secret, I open the box and "let them in on it."

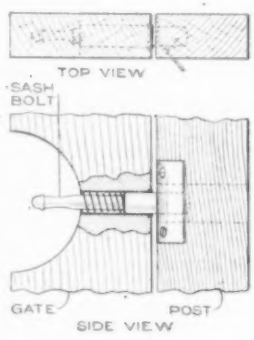
The secret is this: As I place the locomotive against the bottom of the box, I touch a small switch on the side of the box. This turns on the current from four cells in the box, bringing into action a series of electromagnets taken from old bell ringers. These are arranged in a circle, as shown in the detailed view. The action of the magnets on the locomotive causes it to run in a circle and to cling to the bottom of the box. A sheet of cardboard is used for the bottom, and the box is made of thin wood. The batteries are held in place by being set through a round disk of ⅞-in. wood, under which the magnets are also supported, as shown in the side view.—F. E. Brimmer, Dalton, New York.



The Bell-Ringing Magnets are Arranged in a Circle and Mounted on a Wooden Disk, Built into the Box at the Middle

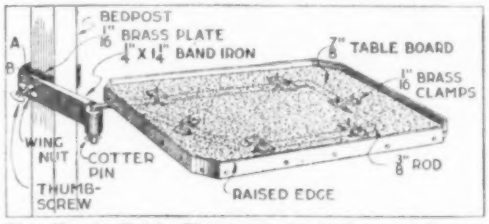
Spring Latches for Small Doors Made from Sash Bolts

In the building of a series of small inclosures and other housing for poultry, sash bolts of the common spring type were found cheap and practical in fitting the doors with latches. The sash bolts were set through the rails of the doors in the same way as they are set into a sash. On the gate posts, or the supports adjoining the door, a small metal guard was fitted, as shown in the sketch. By this means, the action of the bolts was positive, and it was only necessary to push the door shut. Some of the sash bolts have been in use over five years, and are still good. If they wear out, it is an easy job to replace them.—Henry L. Coolidge, Pasadena, California.



Adjustable and Pivoted Bed Table Attached to Bedpost

A table arrangement which can be clamped handily to the bedpost and swung out of the way or removed altogether when not in use, is a convenience that has a wide use in the home. A device of this kind, which requires no floor support and can be folded compactly for storage, is shown in the illustration. The table proper consists of a ⅞-in. board, of suitable size, the edges of which are banded with metal or thin wooden strips. The board is supported on a frame of iron rod, bent to the form indicated in the dotted lines, and clamped with 1/16-in. brass clamps. The end of this frame rod is

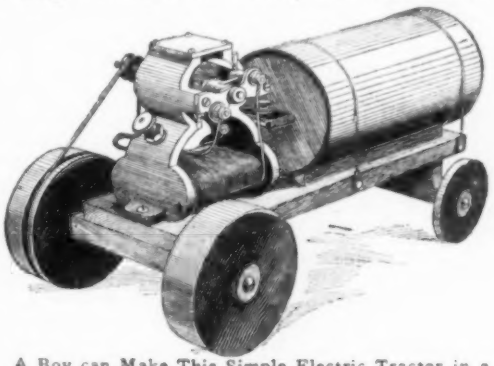


This Handy Table Clamps on the Bedpost and can be Swung Aside Conveniently, or Removed Altogether

bent at an angle and pivoted in a metal bracket. A cotter pin guards against accidental loosening of the joint. The clamping device is made of ¼ by 1¼-in. band iron, and is bent to fit loosely around the bedpost. A brass plate, A, is fitted inside of the main piece B, as shown. A thumbscrew is threaded into the piece B, its point engaging the brass plate, which acts as a guard. In fastening the piece B on the bedpost, the thumbscrew is set, and the wing nut also tightened.—A. Lavery, Garfield, N. J.

A Toy Tractor Built with Dry Cell and Motor

An ordinary two-volt dry cell, a small motor, and the necessary wooden parts, as shown in the illustration, are all that is needed for the making of a toy tractor that will give its builder a great deal of fun. A good feature is that the parts can be taken down quickly and used for other purposes when desired. A base, ½ by 3 by 9 in. long, is made of wood, and two axles

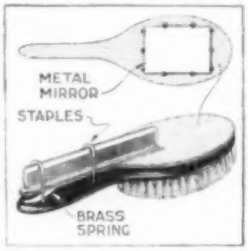


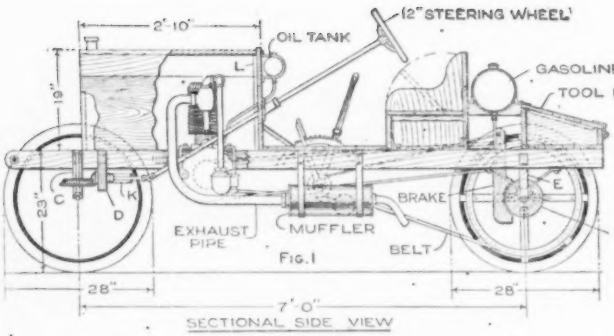
A Boy can Make This Simple Electric Tractor in a Short Time, and will Get Much Fun Out of It

of the same thickness are set under it, as shown. The wheels are disks cut from spools, or cut out of thin wood for the rear wheels, and heavier wood for the front ones. They are fastened with screws and washers, or with nails. The dry cell is mounted on small strips and held by wires. The motor is fastened with screws and wired to the dry cell in the usual manner. One of the front wheels serves as the driver, and is grooved to receive the cord belt.—J. E. Dalton, Cleveland, O.

A Compact Toilet Outfit for the Soldier

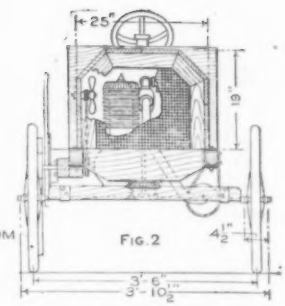
A compact outfit, which the soldier or camper will appreciate, consists of a comb, brush, and mirror, clamped together, as shown in the sketch. Two long staples are set into the back of the brush handle, as indicated. From a board, ¼ in. thick, the backing for the metal "trench mirror" is made, with the handle portion small enough to fit into the staples. A small brass strip acts as a spring when placed near the end of the mirror handle, and holds the outfit snugly.





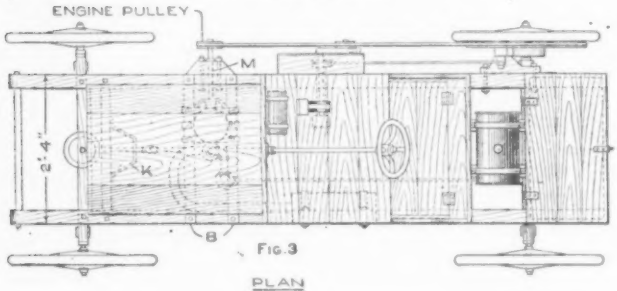
SECTIONAL SIDE VIEW

FIG. 1



FRONT VIEW

FIG. 2



PLAN

FIG. 3

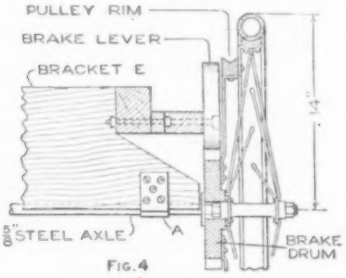
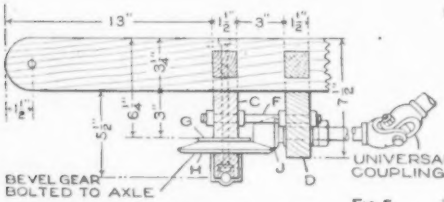


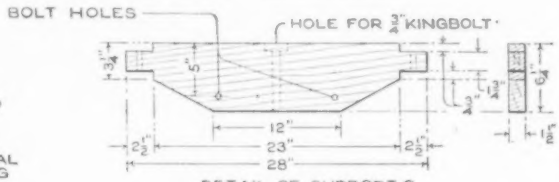
FIG. 4

BRAKE DETAIL

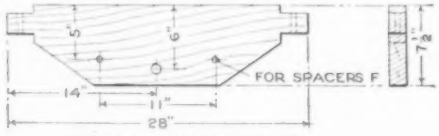


DETAIL OF STEERING GEAR

FIG. 5



DETAIL OF SUPPORT C



DETAIL OF SUPPORT D

REAR-AXLE BRACKET E

FIG. 6

The General Arrangement of the Parts is Shown in the Assembly Views, Figs. 1, 2, and 3. The Brake Detail, Fig. 4, should be Considered with Fig. 9, Shown Separately. The Detail Construction of the Frame and Body can be Readily Understood by Referring to the Assembly Views in Connection with Fig. 7

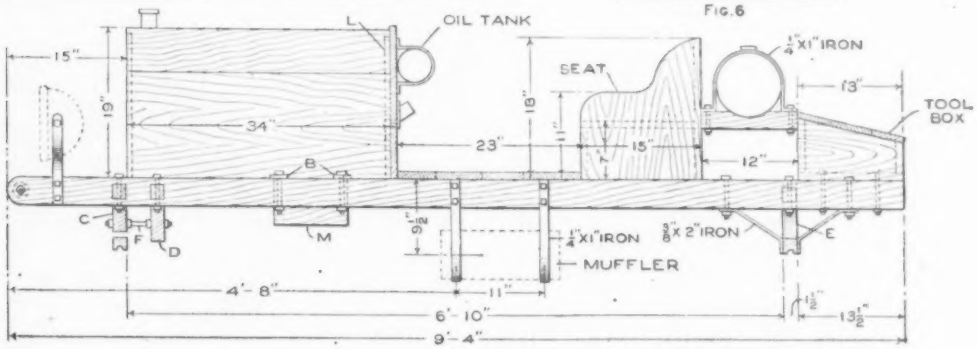


FIG. 7

DETAIL OF FRAME AND BODY

A Boys' Motor Car

HOMEMADE

by P. P. Avery

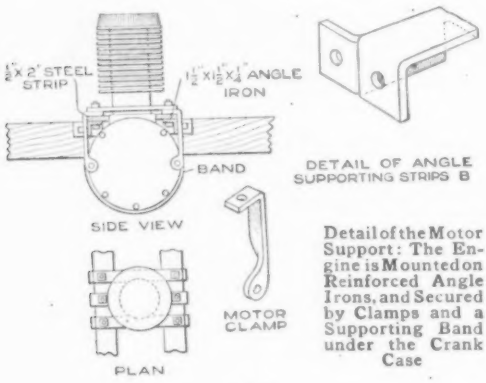
EVEN though the home-built "bearcat" roadster, or other favorite model, does not compare in every detail with the luxurious manufactured cars, it has an individuality that puts it in a class by itself. The amateur mechanic, or the ambitious boy, who is fairly skilled with tools, can build at least the main parts for his own small car, of the simple, practical design shown in the sketch and detailed in the working drawings. If necessary, he can call more skilled mechanics to his aid. A motorcycle engine, or other small gasoline motor, is used for the power plant. The control mechanism of the engine and the electrical connections are similar to those of a motorcycle. They are installed to be controlled handily from the driver's seat. The car is built without springs, but these may be included, if desired, or the necessary comfort provided—in part at least—by a cushioned seat. Strong bicycle wheels are used, the 1½ by 28-in. size being suitable. The hood may be of wood, or of sheet metal, built over a frame of strap iron. The top of the hood can be lifted off, and the entire hood can also be removed, when repairs are to be made. The tool box on the rear of the frame can be replaced by a larger compartment, or rack, for transporting loads, or an extra seat for a passenger.

To Simplify This Small but Serviceable Motor Car for Construction by the Young Mechanic, Only the Essential Parts are Considered. Other Useful and Ornamental Features may be Added as the Skill and Means of the Builder Make Possible

The construction may be begun with the chassis and the running gear. Fit the wheels with ⅝-in. axles, as shown in the assembly views, Figs. 1, 2, and 3, and detailed in Fig. 4. Fit the ends of the axles to the hubs of the wheels, providing the threaded ends with lock nuts. Make the wooden supports for the frame, as detailed in Fig. 6. The axles are fastened into half-round grooves, cut in the bottoms of the supports, and secured by iron straps, as shown in Fig. 4, at A. Make the sidepieces for the main frame 2½ by 3¼ in. thick, and 9 ft. 4 in. long, as detailed in Fig. 7. Mortise the supports through the sidepieces, and bore the holes for the bolt fastenings and braces. Glue the mortise-and-tenon joints before the bolts are finally secured. Provide the bolts with washers, and lock the nuts with additional jam nuts where needed. Keep the woodwork clean, and apply a coat of linseed oil, so that dirt and grease cannot penetrate readily.

Finish only the supporting structure of the chassis in the preliminary woodwork. Set the front-axle and steering-rigging supports C and D, and adjust the spacers F between them. Bore the hole for the kingbolt, as detailed in Fig. 6, and fit the bevel gears and the fifth wheel G, of ¼-in. steel, into place, as shown in Fig. 5. The gear H is bolted to the axle support. The

pinion J is set on the end of a short ¾-in. shaft. The latter passes through the support D, and is fitted with washers and jam nuts, solidly, yet with sufficient play. A bracket, K, of ¼ by 1¾-in. strap iron, braces the shaft, as shown in Fig. 3. The end of this short shaft is joined to one section of the universal coupling, as shown, and, like the other half of the coupling, is



Detail of the Motor Support: The Engine is Mounted on Reinforced Angle Irons, and Secured by Clamps and a Supporting Band under the Crank Case

FIG. 8

pinned with a 3/16-in. riveted pin. The pinion is also pinned, and the lower end of the kingbolt provided with a washer and nut, guarded by a cotter pin. Suitable gears can be procured from old machinery. A satisfactory set was obtained from an old differential of a well-known small car.

Before fitting the steering column into place, make the dashboard, of ⅞-in. oak, as shown in the assembly view, and in detail in Fig. 7. It is 19½ in. high and 2 ft. 4 in. wide, and set on the frame and braced to it with 4 by 4 by 1½-in. angle irons, ¼ in. thick. Fit a ⅞-in. strip of wood around the edge of the dashboard, on the front side, as a rest for the hood, as shown in Figs. 1 and 7, at L. A brass edging protects the dashboard, and gives a neat appearance. Lay out carefully the angle for the steering column, which is of ⅞-in. shafting, so as to be convenient for the driver. Mark the point at which it is to pass through the dashboard, and reinforce the hole with an oak block, or an angle flange, of iron or brass, such as is used on railings, or boat fittings. A collar at the flange counteracts the downward pressure on the steering post. The 12-in. steering wheel is set on the column by a riveted pin.

The fitting of the engine may next be undertaken. The exact position and method of setting the engine on the frame will depend on the size and type. It should be placed as near the center as possible, to give proper balance. The drawings show a common air-cooled motor of the one-cylinder type. It is supported, as shown in Figs. 1 and 3 and detailed in Fig. 8. Two iron strips, B, riveted to 1½ by 1½-in. angle irons, extend across the main frame, and support the engine by means of bolts and steel clamps, designed to suit the engine. Cross strips of iron steady the engine, and the clamps are bolted to the crank case. The center clamp is a band that passes under the crank case.

The engine is set so that the crankshaft extends across the main frame. Other methods may be devised for special motors, and the power transmission changed correspondingly. One end of the crankshaft is extended beyond the right side of the frame, as shown in Fig. 3. This extension is connected to the shaft by means of an ordinary setscrew collar coupling. A block M, Figs. 3 and 7, is bolted to the frame, and a section of heavy brass pipe fitted as a bearing.

The ignition and oiling systems, carburetor, and other details of the engine control and allied mechanism, are the same as those used on the motorcycle engine originally, fitted up as required. The oil tank is made of a strong can, mounted on the dashboard, as shown in Figs. 1 and 2. It is connected with the crank case by copper tubing. A cut-out switch for the ignition system is mounted on the dashboard. The controls used for the engine of the motorcycle can be extended with light iron rods, and the control handles mounted on the dashboard or in other convenient position. The throttle can be mounted on the steering column by fitting an iron pipe around the post and mounting this

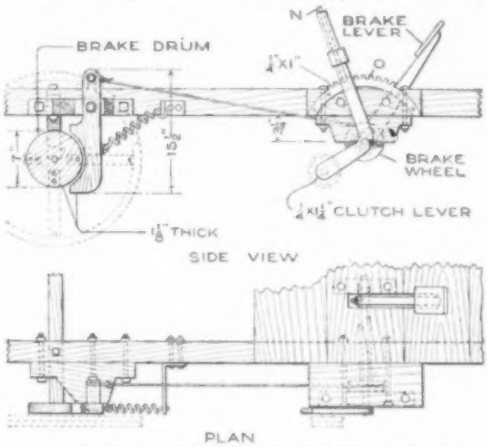
pipe in the angle flange at the dashboard. A foot accelerator may also be used, suitable mountings and pedal connections being installed at the floor.

In setting the gasoline tank, make only as much of the body woodwork as is necessary to support it, as shown in Figs. 1, 3, and 7. The tank may be made of a can, properly fitted, and heavy enough, as determined by comparison with gasoline tanks in commercial cars. The feed is through a copper tube, as shown in Fig. 1. A small venthole, to guard against a vacuum in the tank, should be made in the cap. The muffler from a motorcycle is used, fitted with a longer pipe, and suspended from the side of the frame.

The transmission of the power from the motor shaft to the right rear wheel is accomplished by means of a leather motorcycle belt, made by fitting leather washers close together over a bicycle chain, oiling the washers with neat's-foot oil. A grooved iron pulley is fitted on the end of the motor shaft, and a grooved pulley rim on the rear wheel, as shown in Figs. 1 and 3, and detailed in Fig. 4. The motor is started by means of a crank, and the belt drawn up gradually, by the action of a clutch lever and its idler, detailed in Fig. 9. The clutch lever is forged, as shown, and fitted with a ratchet lever, N, and ratchet quadrant, O. The idler holds the belt to the tension desired, giving considerable flexibility of speed.

The brake is shown in Figs. 1 and 3, and detailed in Figs. 4 and 9. The fittings on the rear wheel and axle are made of wood, and bolted, with a tension spring, as shown. The brake drum is supported on iron bands, riveted to the wheel, and to the pulley rim. The brake arm is connected to the brake wheel by a flexible wire. When the pedal is forced down, the wire is wound on the brake wheel, thus permitting of adjustment. The pedal is of iron and fixed on its shaft with a setscrew. An iron pipe is used as a casing for the central shaft, the shaft carrying the clutch lever, and the pipe carrying the brake pedal and the brake wheel. The quadrant O is mounted on a block, fastened to the main frame. The central shaft is carried in wooden blocks, with iron caps. A catch of strap iron can be fitted on the floor, to engage the pedal, and lock the brake when desired.

The engine is cooled by the draft



DETAIL OF BRAKE AND CLUTCH LEVER

FIG. 9

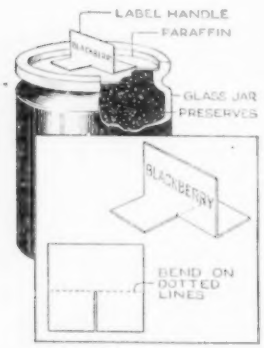
The Brake is Controlled by a Pedal, and a Clutch Lever is Mounted on the Central Shaft, and Set by Means of a Ratchet Device and Grip-Release Rod

through the wire-mesh opening in the front of the hood, and through the openings under the hood. If desirable, a wooden split pulley, with grooved rim and rope belt, may be fitted on the extension of the engine shaft, and connected with a two-blade metal fan, as shown in Fig. 2.

The lighting arrangement may next be installed, gas or electric lamps, run on batteries, being used. Mudguards are desirable if the car is to be used on muddy roads. Strong bicycle mudguards can be installed, the guard braces being bolted on the axles. A strong pipe, with a drawbolt passing through its length, is mounted across the front of the frame. The body is built of ⅞-in. stock, preferably white wood, and is 2 ft. 4 in. wide. A priming coat should be applied to the woodwork, followed by two coats of the body color, and one or two coats of varnish. The metal parts, except at the working surfaces, may be painted, or enameled.

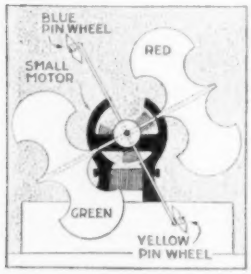
Combined Label and Cover Pad for Preserve Glasses

A neat and convenient method of making a label for jars of preserves, or similar preparations, to serve as a tab for removing the cover of paraffin on the glass, or dish, is shown in the sketch. The tabs are cut from tag board, notched, as shown, and bent on the dotted line. When melted paraffin is poured on top of the material in the jar, the tab is imbedded in it. To remove the paraffin cover intact, a pointed knife is run around the edge, or the glass warmed sufficiently to loosen the cover, which is then easily removed.—Arthur M. Cranford, St. Louis, Mo.



Motor-Driven Entertainer for the Baby

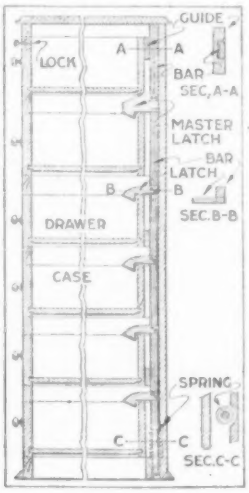
A contrivance that keeps the baby entertained, by the hour, at intervals, and is a big help to a busy mother, was made in a short time. I mounted four wooden arms on a small motor, as shown. On the ends of two of the arms, I fixed small pin wheels, one blue and the other yellow. The other arms hold curious-shaped pieces of bright cardboard, one red and the other green. The driving motor is run by one two-volt cell. The revolving colored pin wheels amuse baby in his high chair, and the device has well repaid the little trouble of making it.—A. H. Lange, St. Paul, Minn.



Simple Concealed Locking Device for Cases of Drawers

A simple method of providing a homemade locking device for a tier of drawers, the use of only one keyed lock being necessary, as is common in manufactured cases, is shown in the sketch. This is applicable to new or old cases, where a space of about 1½ in. is available between the back of the drawers and the rear of the case.

The device, as detailed, consists of a locking bar sliding in guides, screwed or fastened to the back of the case. Attached to the bar are latches one less in number than there are drawers, and spaced apart the distance that each drawer top is above the one below. The upper latch is the master feature. The top of this is beveled off, forcing it downward when the top drawer is closed. The locking bar, with the other latches, also moves down, and the latch fingers engage the backs of the drawers. The connecting bar is operated by a light coil spring, set on a shouldered rod at the bottom of the bar, as detailed.

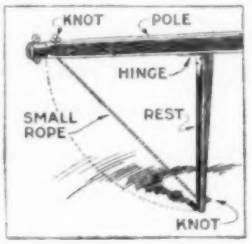


The master latch may be attached at any place on the bar, and should be placed at the bottom drawer, for cases too high to be reached handily. To make the device for a small space, a ¼-in. metal rod, with metal fingers clamped on, can be used. Metal striking plates are then put on the back edges of the drawers.—G. A. Luers, Washington, D. C.

¶Steam-pipe drains should be provided at all points in the line where water is likely to accumulate.

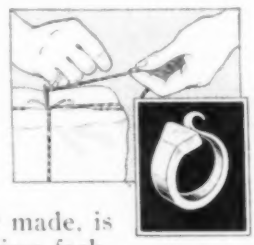
Support for Wagon Pole Aids in Hooking Up Team

To do away with the annoyance and strain of holding up the heavy pole of a mowing machine while fastening the yoke strap to the hames of a restless team of horses, I equipped the pole with a drop stick, or rest. This was made of a 30-in. piece of an old carriage shaft. One end of the rod was hinged to the underside of the pole as shown. When the machine is in operation, the stick is tied up out of the way by means of a rope. This appliance also lengthens the life of the pole, and can be used on various kinds of vehicles.—T. H. Linthicum, Annapolis, Maryland.



String-Cutting Ring Made of Horseshoe Nail

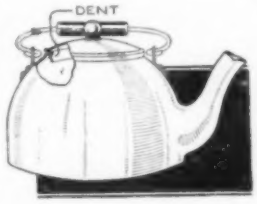
Persons having to tie a large number of packages or parcels soon find that their fingers become sore from breaking the heavy cord in the usual manner by wrapping it around the finger to form a cutting loop. A handy device, that can be easily made, is a string-cutting ring fashioned from a horseshoe nail, as shown. The point of the nail is curled into a hook, and the inner edge of the hook is sharpened. The string is quickly looped around the hook and cut by a slight pull on the free end. The ring is worn on the little finger.—C. C. Spreen, Flint, Mich.



¶A block of soft rubber, 1½ by 3 by 5 in., is useful as a pad for sandpaper in smoothing curved surfaces.

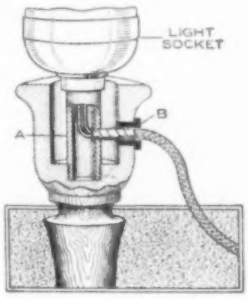
Teakettle Cover Held by Dent in Edge

To prevent kettle covers from dropping off, and the fingers from being burned by the escaping steam, make a small dent in the edge of the lid, as shown. In setting the lid into place, arrange it so that the dent is at the point opposite the spout. Thus, when the water is poured from the kettle, the lid cannot easily tip forward.—W. J. Parks, LaSalle, Ill.



Candlesticks Wired Neatly for Electric Lamps

A number of wooden candlesticks were to be fitted with fixtures for electric lights, and it was found that the types ordinarily available could not be attached in the usual manner. A simple method was, therefore, devised, as shown in the sketch, and proved practical. A short length of brass tubing, A, was screwed into a hole drilled in the bottom of the candle socket, both ends of the tube being threaded. A hole was drilled through the side of the tube, and another through the side of the candlestick cup, as indicated. The hole in the wood was fitted with an insulation ring, B. The wiring, suitably taped, was carried through the opening for it, into the tube, and fastened in the usual manner to a standard keyless socket, which was then screwed to the end of the tube, making a substantial support. The lights were controlled conveniently at the usual wall switches.—Livingston Haviland, Buffalo, N. Y.



Handy Parcel Carrier with Caster Supports

Instead of carrying out an armload, or a boxful, of miscellaneous parcels to the delivery wagon or the customer's

The Parcels are Handled Easily and with Little Danger of Damage by the Use of This Homemade Carrier

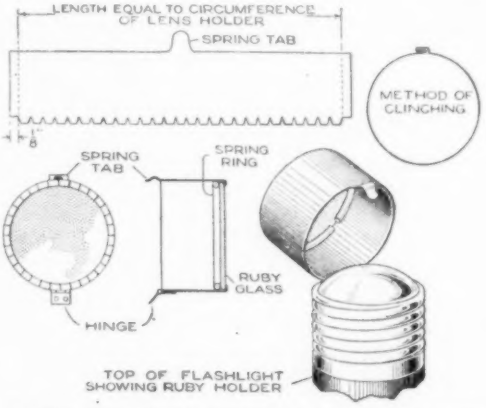
vehicle, an enterprising grocery clerk made a parcel carrier fitted with casters, as shown in the sketch. An ordinary wooden box was used for the tray, and handles were fitted at the ends. The legs were made of light strips nailed as shown. The parcels are loaded into the tray and the arrangement carried or rolled along on the casters, as is convenient. Besides making the work of handling the articles easier, they are kept clean, since it is not necessary to lay them on the walk or other undesirable place.—Avis Gordon Vestal, Chicago, Ill.

Kinks in Cleaning a Typewriter

Irregularities in the feeding of the paper into a typewriter are often due to slippery spots on the platen. To overcome this trouble, clean the platen thoroughly with a mixture of two parts of denatured alcohol to one part of ether. Rub the polished parts with No. 2 emery cloth, then smooth the surface with No. 0 emery cloth. In cleaning a typewriter with gasoline, the effect is to leave the parts dry. A better method is to use a mixture of one part of typewriter oil to 50 parts gasoline. This will leave a fine coating of oil, which is too fine to collect dust, on the working parts.—William Doenges, Fort Sam Houston, Texas.

Red Lens Hinged to Flash Light for Dark-Room Use

Amateur photographers will find a red lens attachment for a hand flash light a useful arrangement for the dark room, when going in or out, and during the process of developing, especially in temporary quarters. To fit the device in place, measure the distance around the outside of the lens holder, and lay out this dimension on a strip of tin, or other metal, 1 in. wide, as shown. Then add ⅛ in. at each end, and an extra strip, which should be cut into ¼-in. sections, along the whole length. A spring tab, midway along the top edge of the metal, is also made. Curl the piece to a cylindrical form and clinch the joint as detailed, and bend the notched tabs into place. Slip a piece of ruby glass into the cylinder and hold it against the notched tabs with a spring ring. Then solder a small hinge to the edge of the cylinder and to the lens holder on the flash light, so that the spring tab will



A Ruby Cap Hinged over the Lens of an Ordinary Flash Light Is a Convenience for the Dark Room

snap into place. When a white light is wanted, the red-glass fitting is released, as shown.

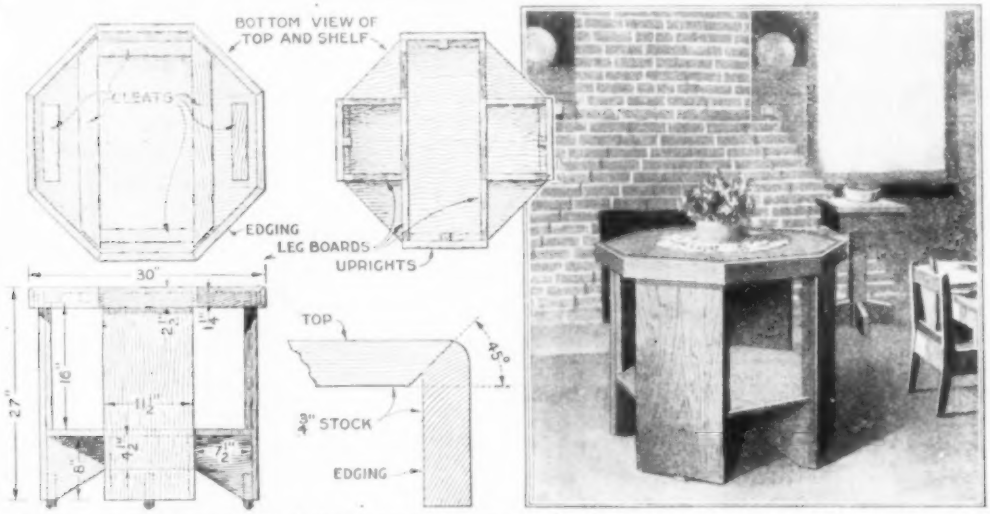
An Octagonal Mission Center Table

By HENRY SIMON

THE home craftsman who is fairly skilled with woodworking hand tools will be well repaid for a little extra care in making this mission center table, of unusual design. Most of the woodwork involved in its construction is quite simple, the element calling for careful work being the laying out and shaping of the octagonal top and the shelf. Because of the wide surfaces exposed it will also pay the maker to plane, scrape, and sand down these surfaces carefully. By selecting the best pieces of wood and setting their better sides out, the effect is also enhanced.

When the top and shelf are dry, brace the top with cleats screwed on underneath, as shown in the bottom view of the top. Lay out the shelf accurately, and shape it to a perfect octagon, 25 in. across from opposite parallel sides. Make a strip, 1⅝ in. wide, and use it in marking the layout for the top, from the shelf as a pattern, the edges of the top being parallel with those of the shelf and 1⅝ in. from them.

Assemble the parts as shown, using glue and screws where practicable, and properly set nails for places where the fastening will be exposed. All the stock



The Home Craftsman will Find the Making of This Octagonal Mission Center Table a Novel Piece of Construction. It Offers No Special Difficulties if Care is Taken in the Shaping of the Top and Shelf

The table can be finished in a variety of ways to suit the furniture of the room where it is used. Various kinds of hard wood are suitable, quarter-sawed oak being preferable.

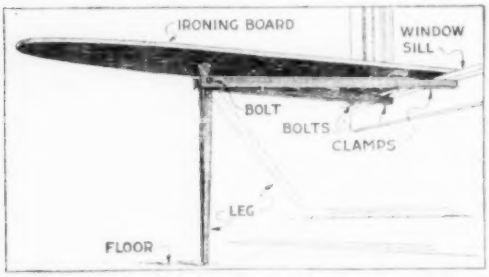
Begin the construction by gluing up the pieces for the top and the shelf. While they are drying, make the pieces for the legs, the lower braces, and the strips for the edging of the top. The upper portion of the legs is of double thickness, ⅞-in. stock being used throughout. Fit the lower supporting framework together as shown in the bottom view of the shelf, two of the braces extending across the bottom and the others butting against them.

should be cleaned up thoroughly both before and after assembling. Four pieces for the casters are fastened to the legs with screws. The edging for the top may be mitered, with a rounded corner, as shown in the detail, or butted square against the edge of the top, as indicated in the photograph and the plan of the top, the latter method being far easier.

¶The nuisance of tracking dust and ashes from the basement can be overcome, to a considerable extent, by providing carpet mats on two or three lower treads of the stairs leading from the basement to the rooms above.

Folding Ironing Board Clamps on Edge of Table or Window

An ironing board is usually most convenient for use when its left end is set near a window, or other source of light. The arrangement shown in



This Rigid Ironing Board Folds Compactly and can be Set Up with Ease at the Window Sill

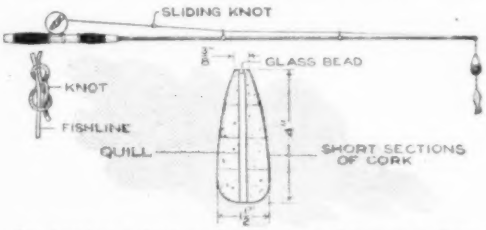
the sketch was designed with this in mind, and other interesting features were added. The top is of the usual type. Arranged underneath it is a cross cleat near one end. Bolted through this are two clamps which engage the edge of the window sill or table. They are clamped by lowering the leg from its folded position, underneath the top, as indicated. The bolts at the clamps are adjustable for gripping various thicknesses of table tops, etc., between the clamps and the top. The lower end of the leg can be fitted with a sliding adjustment, if the board is used at different heights, the design being otherwise the same.—T. J. Hubbard, Mendota, Ill.

Wire Trellis Fastened Neatly to Brick Walls

A desirable vine often has not the natural ability for clinging to stone, and other walls, and a suitable aid must be provided to support it. Fastening a wire trellis to such a wall is a good method. Screw anchors are used, which fit into holes drilled for them and expand under the pressure of the screw. Staples may also be used in walls laid up in mortar. A $\frac{5}{16}$-in. screw anchor will hold an ordinary fence staple, and requires a $\frac{7}{16}$-in. hole. After the staple has been placed over the wire its ends are pinched together and driven into the anchor socket. The staple is held firmly, and will support a considerable load. First fasten the trellis of wire mesh to the wall, at the top, very securely. A chalk line aids in setting the wire straight. If carefully done, the trellis will be hardly noticeable, and the wall will be unmarred.—C. L. Meller, Fargo, N. D.

A Homemade Fishing Float Adjustable to Depth

A novel device for fishing, especially with a short bait-casting rod, is a float that can be adjusted to the depth of water in which it is desired to fish. The float is hollow and slides on the line. To use it, the casting lead and hooks are adjusted as usual, and a sliding knot on the line is set for the depth desired, and the cast made. The



By Setting a Sliding Knot on the Line, as a Stop for the Float, the Depth at Which the Sinker is Desired can be Easily Regulated

float will stop at the sliding knot, and remain on the surface. In reeling the line, the knot passes freely through the guides, and the float slides down on the line until it reaches the casting weight.

Cork is a good material from which to make the float. Cut the cork in sections, as shown, and fit it over a large quill, which provides a smooth-running hole through the float. Fit a small glass bead in the upper end of the float, as a stop for the knot. The knot is of the figure-eight type, and tied as shown in the detail at the left. It slides easily, but grips the line tightly enough to stop the float. An ordinary float can be altered for use as described.—Charles Carroll, Baltimore, Maryland.

Automatic Electric Brake for Disk Talking Machine

By L. B. ROBBINS

BY employing electric current for an automatic stop or brake on a disk talking machine, a reliable device was made, at a slight expense, when various mechanical stops were found faulty. The action depends upon the completion of a circuit at the instant the needle reaches the last groove of the record, and by means of a magnet releases a brake rod which stops the turntable, as indicated in Fig. 1. The dimensions of the magnetic brake permit it to be attached to most ordinary machines, although the details may have to be altered in special instances.

The operation of the device is as follows: Set the needle in the last groove of the record, and swing the contact arm so that the point just touches the contact plate B, Fig. 1. Push the brake from the turntable so that it engages the trigger, as in the top view, Fig. 2. Swing the reproducer arm back, and start the record. When the needle reaches the last groove, the contact arm A touches the contact plate B, completing the circuit, which flows from the battery to N, in the top view, through F, along the trigger D, the brake E and the spring K, into the magnets and out at M. The magnets C draw and release the trigger D, bringing the brake E into action against the turntable. The instant the trigger leaves the screw F, the current is broken. The tension of the spring G is only sufficient to bear the trigger against the screw F.

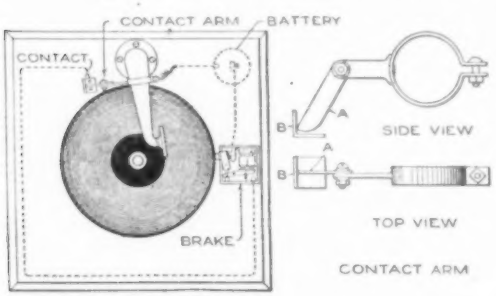


Fig. 1

The Machine is Automatically Stopped when the Needle Reaches the Last Groove of the Record

The construction of the braking device is detailed in Fig. 2. The base is of oak, and the bell magnets usually measure 1½ by 1¼ in. in a set. Bolt these to the base by means of an angle iron, H, of soft iron. The brake E, and

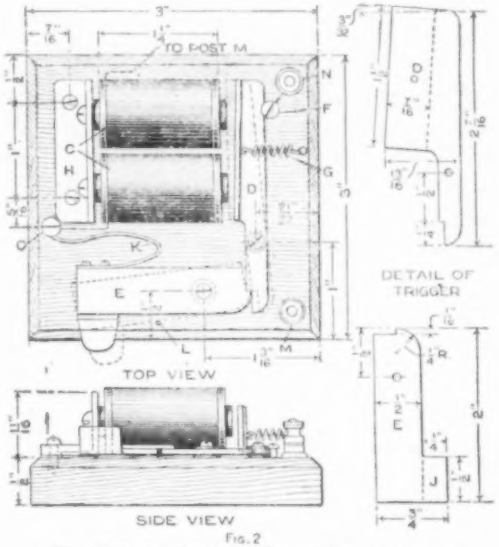


Fig. 2

The Electromagnet is Mounted on a Base and Fitted with a Trigger Device

the trigger D, are shown in detail. They are made of soft iron, drilled as indicated. The lug J is turned up at a right angle, and a small block of felt is glued to it. The 1½-in. side of the trigger D is also bent at a right angle, on the dotted line. The brake spring K is made of steel watch spring, the temper drawn at each end in order to drill it. The tension is just enough to force the brake sharply against the limiting pin L. M and N are binding posts set on the base. The terminal wire from the magnet is connected to M, and the lower terminal is connected to the screw O with a drop of solder. Binding post N is wired to the screw F. The connections are made on the underside of the base.

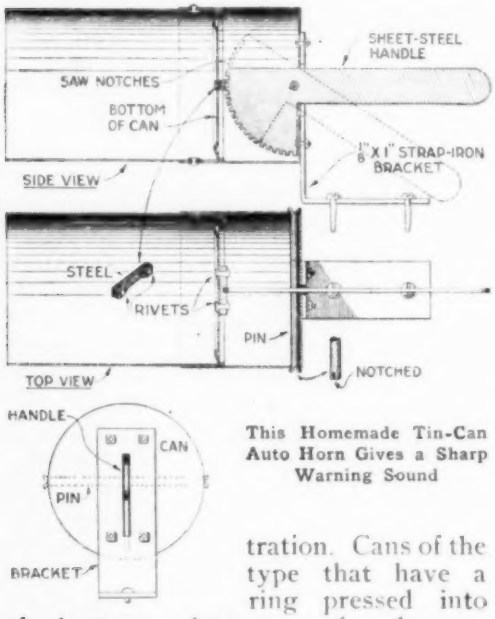
The contact arm, Fig. 1, is made of a hose clamp, which clamps around the arm of the machine. The pieces A and B are of strap iron, fastened as detailed. The pivoted joint is bolted with spring washers, holding the arm at a tension. The clamp is lined with felt to prevent scratching of the nickel finish. Place a

record upon the turntable and insert the needle in the last groove. Then swing section A of the contact arm down at a 45° angle, and at that point fasten the contact plate B.

The method of wiring is shown in Fig. 1. Arrange two brass spring clips on the inside of the cabinet to accommodate an ordinary flash-light battery, which will furnish ample current.

Automobile Horn Made of Tin Cans

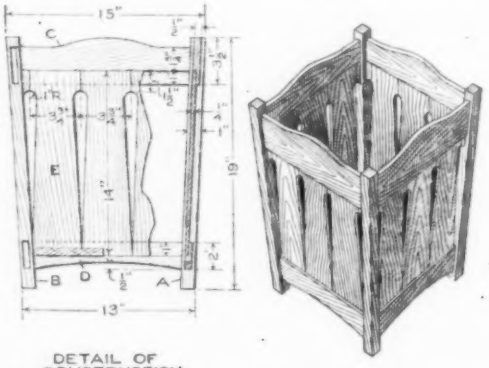
Ordinary tin cans can be converted into an automobile horn that gives ample warning to the pedestrian, by fitting it with a ratchet handle and extending one end, as shown in the illustration. Cans of the type that have a ring pressed into the bottom and top, near the edge, are best, as the bottom can be sprung in and out easily. A heavy baking-powder can, from which the lid can be removed readily, is suitable. Fit the bottom of the can with a small strip of steel filed to the shape shown in the top view, and rivet it at the middle of the bottom. Cut a smaller section of another tin can just large enough to slip over the end of the first one. Arrange it with holes so it can be riveted into place when the mechanism is complete. Next make the handle of sheet steel, sawing notches into the quadrant, as indicated. Rivet the bracket, as shown, slotted for the handle, which projects from the center of the can. The handle is pivoted on a $\frac{3}{16}$-in. pin, set in place by notching the ends, as shown, and spreading the notches. The bracket serves as a support and is fastened at a convenient place on the car.



This Homemade Tin-Can Auto Horn Gives a Sharp Warning Sound

A Light Wooden Waste-Paper Basket

A favorite job for the home furniture maker is a waste-paper basket. That described is of simple and pleasing outline, and has the essential feature of a waste-paper basket in that it tapers toward the bottom, making it easy to remove the contents without handling the paper. The corner posts, as detailed at A and B, are 1 in. square, and 19 in. long. The top rails C are mortised into the legs, as are the bottom rails D. The mortises and tenons should be cut before the edges of these pieces are shaped. The top edge of the rail D and the lower edge of the rail C, on the inner faces, are rabbeted out to receive the ends of the panels E, which lap over the rails 1 in., and are glued and nailed to them. Shape all the panels E at the same time, clamping them together. All of the pieces should be smoothed and sandpapered carefully before assembling the parts,



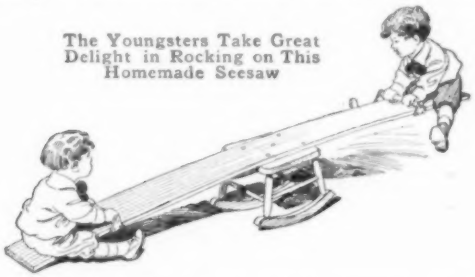
DETAIL OF CONSTRUCTION

This Waste-Paper Basket of Simple Outline can be Made Handily in the Home Workshop

and then gone over lightly before the finish is applied, when the construction is complete. The wood may be finished in any of the common finishes, preferably a stain and varnish effect, to match other furniture in the room, where the basket is used.—George W. Bretz, Berwick, Pa.

A Children's Seesaw Built from Old Rocker

An easily constructed amusement device for small children is a seesaw made from a discarded rocking-chair. The back of the chair is removed, and the long ends of the rockers cut off, or the rockers refitted so that the ends are of equal length from the center. The legs can also be braced with boards if such strengthening is necessary. A suitable board is fastened to



The Youngsters Take Great Delight in Rocking on This Homemade Seesaw

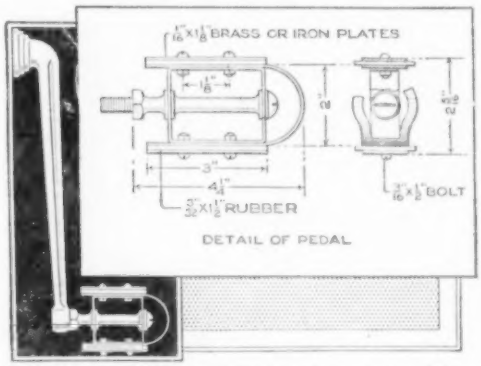
the top of the chair with screws, and handholds are provided, as shown. The rocker support should be made low enough so that there is little danger from a fall.—Harry R. Shiffer, Philadelphia, Pa.

Indoor Pulley Clothesline Rigged from Ceiling

Drying clothes in the kitchen during bad weather is an unpleasant necessity many times, particularly to the men in the household. By way of a constructive suggestion, one man of the house overcame the unpleasant features to a large extent by arranging a series of pulleys at the ceiling and suspending the clotheslines from them. The lines were arranged to be lowered easily, in fastening and removing the clothes, and could also be handily drawn up out of the way.

Bicycle Pedals Fitted with Nonslip Pads

By this easy method, in 1½ hours, I made my bicycle pedals nonslip. This

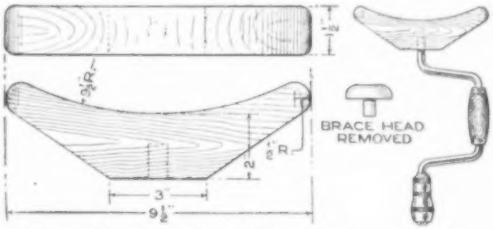


The Bicycle Pedals were Made Safe, and Less Wearing on Shoe Leather, by Fitting Them with Rubber Pads

was necessary because the sharp edges on the pedals wear down, and also wear the shoe soles. The feet slipping off may easily result in an accident. Metal plates, 1/16 by 1⅛ by 3 in. long, were fitted with rubber pads, 3/32 by 1½ by 3 in. long, and bolted on the side of the pedals.—A. Midland, New York, N. Y.

Large Brace Head Handy for Heavy Hand Drilling

The home mechanic often finds it necessary to drill large holes, or to drill holes of considerable size in metal. With an ordinary brace, no drill press being available, this work is difficult. A worth-while kink is to make a large wooden head, padded if desired, to fit the brace, and use it in place of the or-

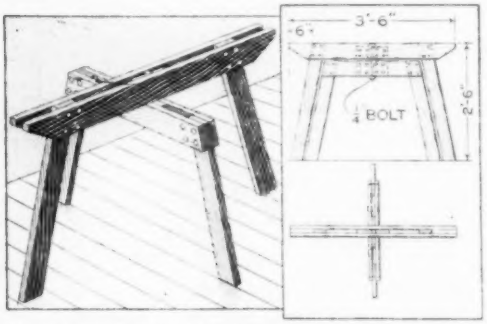


Heavy Hand Drilling is Made Easier by Fitting the Brace with a Large Head

dinary brace head. The large head is cut to the shape shown, and the corners are rounded off smoothly.

Folding Supports for Dining Table Superior to Usual Trestles

At dinners, and other functions, where a large number of persons are seated at temporary tables set up on trestles, the seats adjoining the table



The Simple Folding Construction of Trestles of This Type Makes Them Convenient in Use and Storage

supports are usually objectionable. It was to overcome the undesirable features of the usual sawhorse trestle that the one shown in the sketch was designed. Many of this type have been built and proved practical, both in use and in storage, requiring a minimum of space when folded. The dimensions given are standard, and can, of course, be varied to suit special conditions. Blocks, in the center of each section, provide a support for a bolt, on which the pairs of legs are pivoted, when the trestles are set up for use. The strips for the larger section are ⅞ by 3 in. wide for the legs, and 4 in. for the top. Those for the inner section are ⅞ by 2½ for the legs, and 3 in. wide for the top.—B. R. Bush, Bay Shore, N. J.

Carbon-Covered Typewriter Platen for Backing Impressions

Where tracing paper, or tracing cloth, is to be used for blueprint reproduction of typewritten text, it is desirable that the impression be made on both sides of the sheet. A timesaving kink is to roll a sheet of carbon paper around the platen with the carbon side exposed. The sheets are then placed in the typewriter in the usual manner, and each one is given a double impression.

Removing Caked Substance from Bottom of Bottle

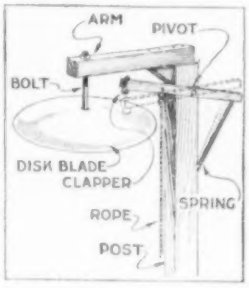
It is frequently desirable to remove from the bottom of a bottle, or other receptacle, a substance which has become caked or crystallized. The material can be easily and efficiently removed by taking advantage of the fact that solutions are heavier than the pure solvent. The receptacle containing the solid is filled with water, and inverted in a pail of water. On coming in contact with the solid, the water dissolves a little of it, and the solution, being the heavier, falls. A current is thus started, and continues to flow as long as any of the solid is left.—Daniel Gray, Dickinson, N. D.

Container Keeps Developing-Out Paper Dry

Photographic developing-out paper should be kept dry, and unless the developer used on damp paper is abnormally strong, white splotches, called "freaks," are likely to ruin the prints. Paper stored in a receptacle containing lumps of unslaked lime becomes and remains dry. The photograph shows a drier made by cutting out the top of an old 5-gal. oil-can. A few lumps of lime are placed in the bottom, and the paper stored over it on loose shelves. The can is covered with a piece of board, felted on the underside to make a tight joint. A metal container is essential, because it affords protection against moisture and guards against danger from the heat generated by the slaking lime, if the can is left uncovered during wet weather. Ordinarily the lime slakes slowly; when slaked, it should be removed and replaced by fresh lime.—B. Hayes, Boston, Mass.

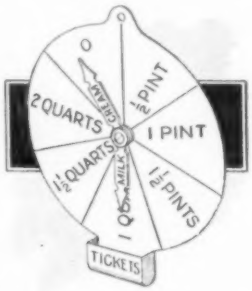
Old Harrow Disk Rigged as Dinner Gong

A farmer made use of an old disk from a harrow, and saved himself the expense of buying a much-needed dinner bell by rigging the disk on a post, as shown in the sketch. The disk was bolted loosely to a cross arm braced from the top of the post. A lever with a metal knob, or clapper, bolted to one end, was pivoted at the middle on the post and fitted with a spring at the other, to provide a striking mechanism. The spring holds the knob away from the gong, and the rope, extending to the ground, or to within easy reach, is pulled to ring the gong. The steel disk, when struck, produces a sound that can be heard at a long distance.—Dale R. Van Horne, North Loup, Neb.



Dial Indicator and Ticket Holder for Milk Delivery

A novel device, which is useful to the householder in ordering milk without waiting for the milkman, is a dial and ticket holder like that shown in the sketch. The dial is made of sheet metal, brass or galvanized iron being suitable, and the various quantities of milk or cream desired are marked on it. By means of the two hands the quantity desired is indicated, and the tickets are placed in the clip below the dial. A rubber washer holds the hands steady. The dial may be painted or enameled.—Joseph H. Blumenthal, Detroit, Mich.

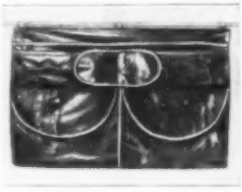


Cork Bumpers Improve Noisy Pail Handles

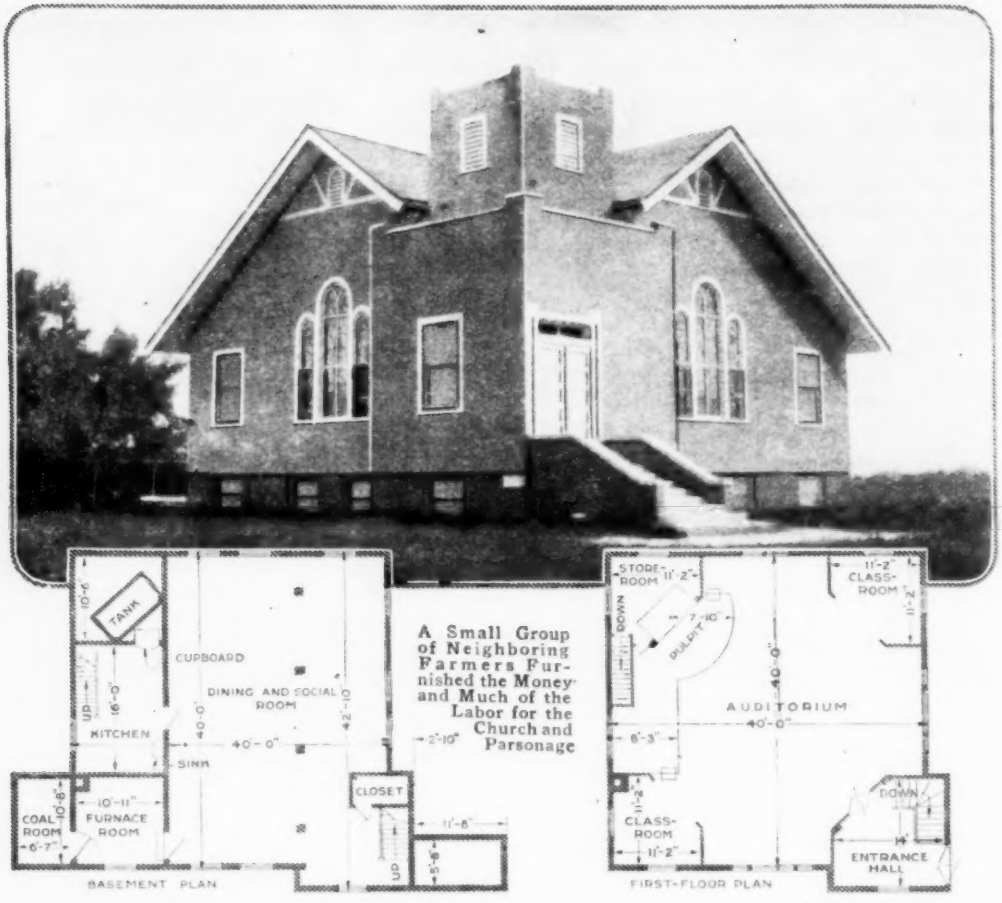
The handles of sheet-metal pails, especially in the larger sizes, often cause much noise, unless the bucket is handled carefully. By fitting the handle with cork bumpers, as shown, most of this noise is avoided. Ordinary corks, about 1 in. in diameter, are split and grooved to fit the handle, and are bound into place with fine wire, or strong twine. The corks are quickly replaced when worn.

Homemade Bag of Pockets for Auto Robe Rail

A bag of pockets to be hung from the robe rail of an automobile was designed by a woman "seventy years young," and, as shown in the photograph, may offer suggestions to other ingenious workers. Black oilcloth was used and the edges were trimmed with tape. The front was cut 27 by 16 in. The main compartment at the back has bellows ends which extend to the bottom, making a roomy pocket. On the front of this pocket are two half pockets, covered by the rounded flaps. Near the top of these are long, narrow pockets covered by a double flap, the ends of which are fastened with snap buttons. The back piece is cut wide enough to allow for folding over and fastening to a stick, the length of the bag. Picture hooks are sewed over the stick and covered by the cloth, forming a convenient support from the robe rail, and permitting ready removal.—A. May Holaday, Chico, Calif.



ATTRACTIVE RURAL CHURCH AND PARSONAGE



E. O. GALPIN, ARCHITECT

IN a rural district near Beaver, Ia., a church and parsonage have lately been erected that reflect considerable credit on the progressiveness of the community. They would do justice to almost any small-town parish boasting a congregation twice as large as the country one that made their construction possible. Although only recently completed, they have already served as models for another community and are being duplicated. Including the cost of the 10 acres of land on which they are situated, the buildings represent an investment of about $10,000. Exclusive of donated labor, which was of much assistance, the residence cost approximately $2,700 and the church $3,300. Both are modernly equipped and conveniently arranged for the purposes to which they are put. The basement and floor plans presented above explain the manner in which the church space is divided. There is a noteworthy feature, however, that is not made clear by the drawings. An unobstructed view of the pulpit is afforded from one of the Sunday-school rooms when its large entrance is open. This space, during services, is reserved for mothers who have infants with them. The provision is one that enables a number of women to attend church who might otherwise remain away. With the 10 acres of ground at his disposal, the minister is given an opportunity to utilize his spare time profitably. The church, on the other hand, fills an important function other than a religious one for the community. It serves as a convenient meeting place for the local farm association, Red Cross workers, and other bodies. Entertainments are frequently held, the parish orchestra has its rehearsals there, and plans are now under way for the organization of night-school classes to be conducted at the church.